dpr

Department of Pesticide Regulation

Paul E. Helliker
Director

Gray Davis
Governor

Winston H. Hickox
Secretary, California Environmental Protection Agency

MEMORANDUM

TO: Gary M. Carlton, Executive Officer
California Regional Water Quality Control Board
Central Valley Region
3443 Routier Road
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FROM: Paul E. Helliker Paul Helliker
Director
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DATE: January 7, 2002

SUBJECT: RICE PESTICIDES PROGRAM REVIEW

Pursuant to the Rice Pesticides Program being conducted for 2001, Department of Pesticide Regulation (DPR) staff has prepared the following summary of rice pesticide applications, water monitoring of surface waters, and laboratory analyses results.

DPR's Rice Pesticides Program is an effort to protect water quality in receiving waters adjacent to rice fields, including agricultural drains and the Sacramento River. DPR and county agricultural commissioners (CACs) enforce specific management practices designed to meet water quality performance goals aimed at protecting receiving waters from aquatic toxicity and protecting raw drinking water from rice pesticides. These water quality performance goals were established by the Central Valley Regional Water Quality Control Board (CVRWQCB) and are contained in the Water Quality Control Plan (Basin Plan) Central Valley Region for the Sacramento River Basin.

Pesticide use data for 2001 are based on preliminary data reported to DPR at the end of the rice pesticide application period, prior to inclusion in DPR's Pesticide Use Report (PUR) database. Therefore, 2001 rice pesticide data in this report are subject to revision after error checking procedures are carried out on the data submitted.

The most significant features of the 2001 rice pesticide application season follow:

- There were 496,130 acres of rice planted in the Sacramento Valley in 2001, a reduction of 78,471 acres compared to 574,601 acres planted in 2000.

- There were no emergency releases granted in 2001 in the Sacramento Valley.

- There were 217,250 acres reported treated with molinate (Ordram®) in 2001, a decrease of 50,969 acres compared to 268,219 acres treated in 2000.

- Thiobencarb (Abolish® and Bolero®) use decreased by 59,079 acres--from 240,116 acres reported treated in 2000, to 181,037 acres treated Sacramento Valley-wide in 2001.

- There were 300,595 acres reported treated with propanil (Stam®, SuperWham®, WhamEZ®).

- There were 197,202 acres reported treated with triclopyr (Grandstand®).

- There were 94,513 acres treated with lambda cyhalothrin (Warrior®) and 12,114 acres reported treated with diflubenzuron (Dimilin®).

- As of December 15, 2001, there were 21,137 acres reported treated with cyhalofop-butyl (Clincher®). DPR is anticipating additional data to be submitted soon.

- There were no acres reported treated and no detections of methyl parathion in water samples analyzed.

- There were 1,180 acres treated with malathion and one detection on May 10 of 0.0528 parts per billion (ppb) of malathion in water samples collected at Colusa Basin Drain (CBD5). The performance goal for malathion is 0.10 ppb and was not exceeded.

- The CBD5, Butte Slough (BS1), and the Sacramento River at the Village Marina (SR1) were monitored for the rice pesticides molinate (May 1-July 12), thiobencarb (May 1-July 12), carbofuran (April 24-June 28), methyl parathion and malathion (April 24-June 28), propanil (May 8-July 26), and triclopyr (May 22-July 26). Toxicity tests using *Ceriodaphnia dubia* were performed at CBD5 once per week for ten weeks (April 24-June 26). Significant mortality of *Ceriodaphnia dubia* was observed in one sample taken on May 29.

A summary of rice pesticides detected in Sacramento Valley waterways in 2001 follows:

<u>CBD5</u>

- Molinate was detected above the performance goal (10.0 ppb) on May 8 (10.5 ppb), May 15 (12.1ppb), and May 24 (12.7 ppb) in 2001. Seventeen detections of molinate occurred from May 1-June 26.

- Molinate concentrations were lower in 2001 than in 2000 at CBD5. Peak concentrations were twice as high in 2000--on May 18 (22.0 ppb) and on May 25 (21.2 ppb)--than in 2001.

- Thiobencarb was detected above the performance goal (1.5 ppb) during 11 sampling events beginning May 8-June 12. Eighteen detections of thiobencarb occurred from May 1-July 12.

Peak concentrations of thiobencarb occurred on May 10 (5.9 ppb) and May 24 (5.5 ppb) in 2001.

- Peak concentrations of thiobencarb at CBD5 in 2000 were on May 18 (10.7 ppb) and May 25 (10.4 ppb), almost twice the peak concentrations as in 2001. Thiobencarb concentrations were lower in 2001 than in 2000 at CBD5.

- A single detection of 0.0528 ppb malathion was detected on May 10 and did not exceed the performance goal (0.1 ppb) in 2001 at CBD5.

- Malathion was detected nine times in 2000 and the performance goal was exceeded five times. Frequency and concentrations of malathion were much lower in 2001 than in 2000 at CBD5.

- There were no detections of carbofuran or methyl parathion at CBD5 in 2001.

- In 2001, there were 15 detections of propanil between May 29-July 19 at CBD5. The highest detection was reported at 20.6 ppb on May 29. Detections of propanil were higher in 2001 than in 1998, the last time propanil was monitored. CBD5 was the only site where propanil was monitored in 1998. In 2001, CBD5, BS1, and SR1 were all monitored for propanil.

- In 1998, propanil concentrations ranged from 0.32-5.87 ppb at CBD5. The average concentration was 2.35 ppb. There were 84,500 acres treated with propanil in 1998.

- In 2001, propanil concentrations ranged from 0.07-20.6 ppb, and the average concentration over the monitoring period was 3.89 ppb. There were 300,595 acres treated with propanil in 2001.

- Aquatic toxicity data indicates an LC_{50} value (48 hours) of 140 ppb for *Daphnia magna* to propanil. No drinking water quality criteria have been established for propanil.

- Eighteen detections of triclopyr occurred between May 29-July 26 at CBD5. The highest detection (5.28 ppb) occurred on June 21. Detections of triclopyr were lower at CBD5 in 2001 than in 1998, the last time it was monitored. CBD5 was the only site where triclopyr was monitored in 1998. In 2001, CBD5, BS1, and SR1 were all monitored for triclopyr.

- In 1998, triclopyr concentrations ranged from 0.40-8.86 ppb at CBD5, and the average concentration during the monitoring period was 4.46 ppb. There were 104,016 acres treated with triclopyr in 1998.

- In 2001, triclopyr concentrations ranged from 0.83-5.28 ppb at CBD5, and the average concentration during the monitoring period was 2.70 ppb. There were 197,202 acres reported treated with triclopyr in 2001.

- Aquatic toxicity data indicates an LC_{50} value (48 hours) of 132 parts per million (ppm) for *Daphnia magna* to triclopyr. No drinking water quality criteria have been established for triclopyr.

Butte Slough (BS1)

- Molinate was detected seven times from May 15-June 26, 2001, and exceeded the performance goal on May 29 (17.1 ppb) and June 5 (11.2 ppb).

- Molinate was detected five times in 2000. The performance goal was exceeded twice, and the highest concentration was 11.5 ppb on May 30.

- Thiobencarb was detected three times between May 22 and June 5 in 2001. The performance goal (1.5 ppb) was met or exceeded on May 29 (2.6 ppb) and June 5 (1.5 ppb).

- Thiobencarb was detected five times in 2000. The performance goal was exceeded twice with the highest detection at 1.6 ppb.

- There were no detections of carbofuran, methyl parathion, or malathion at BS1 in 2001.

- There were five detections of propanil between June 5 and July 3, 2001. The highest concentration was 1.45 ppb on June 19. Propanil was not monitored at BS1 in 1998, so there was no comparison data.

- There were seven detections of triclopyr between June 12 and July 26, 2001, at BS1. The highest concentration was 2.12 ppb on July 3. Triclopyr was not monitored at BS1 in 1998, so there was not comparison data.

SR1

- Molinate was detected on May 22 (2.03 ppb) and May 29 (2.12 ppb) in 2001 at SR1.

- In 2000, molinate was detected four times below the performance goal (10.0 ppb). The peak concentration of molinate was on May 30 (1.92 ppb) in 2000.

- Thiobencarb was detected on May 22 (0.50 ppb) in 2001. There were no detections of thiobencarb at SR1 in 2000.

- There were no detections of carbofuran, methyl parathion, or malathion at SR1 in 2001.

- Propanil was detected one time on July 3, 2001 (0.068 ppb). No monitoring of propanil was conducted at SR1 in 1998, so no comparison data was available.

- Triclopyr was detected six times from June 19-July 24, 2001. The highest concentration occurred on July 10 (1.56 ppb). No monitoring of triclopyr was conducted in 1998, so no comparison data was available.

City of Sacramento (SRR-1)

- Molinate was detected eight times at the City of Sacramento drinking water intake (SRR-1), from May 9-June 13, 2001, for eight consecutive sampling events. The highest detection occurred on May 29 (1.4 ppb). The primary maximum contaminate level (MCL) for molinate is 20 ppb.

- Thiobencarb was detected four times from May 15-May 29. The highest detection occurred on May 29 (0.38 ppb). This level exceeded the CVRWQCB concentration of 0.34 ppb as described in *Resolution No. 5-01-074, Approval of the Management Practices Required by the Department of Pesticide Regulation's Rice Pesticide Program for the 2001-2003 Seasons* (appendix 5). The MCL for thiobencarb is 70.0 ppb. The secondary action level of 1.0 ppb for off-taste set by the California Department of Health Services was not exceeded. The City of Sacramento reported that there were several taste complaints during the weeks of May 7 through 14, and in June during the 2001 period of rice pesticide use.

- Due to laboratory instrument sensitivity issues, the City of Sacramento reported the detection limit was changed from .10 ppb to 0.20 ppb in 2001 for thiobencarb.

City of West Sacramento

- In 2001 the City of West Sacramento, in cooperation with the City of Sacramento, submitted water samples from the West Sacramento drinking water intake (SRR-2) to the City of Sacramento's Water Quality Laboratory for analysis. This was due to the City of Sacramento's ability to detect molinate and thiobencarb at low detection limits and previous monitoring of West Sacramento drinking water for rice pesticides was not routinely performed and detection limits were historically higher.

- Molinate was detected May 9-June 13, during eight consecutive sampling events. The highest concentration detected occurred on May 29 (1.7 ppb).

- Thiobencarb was detected on four consecutive sampling events from May 21-June 1. The highest detection occurred on May 21 (0.59 ppb). Thiobencarb was also detected May 29 at a concentration of 0.45 ppb. The two highest concentrations exceeded the CVRWQCB concentration of 0.34 ppb as described in *Resolution No. 5-01-074, Approval of the Management Practices Required by the Department of Pesticide Regulation's Rice Pesticide Program for the 2001-2003 Seasons* (appendix 5).

Aquatic Toxicity

- Toxicity to *Ceriodaphnia dubia* was observed in the water sample collected at CBD5 on May 29. Companion field monitoring samples indicated detections of thiobencarb at 4.0 ppb and molinate at 3.1 ppb. No other samples analyzed resulted in significant mortality of *Ceriodaphnia dubia.*

- Concern exists regarding potential aquatic toxicity and sediment accumulation that can occur with pyrethroid insecticide use. Department of Fish and Game (DFG), Syngenta (formerly Zeneca, registrant for Warrior®), and DPR staff sampled water and sediment for lambda cyhalothrin, the active ingredient of Warrior® in 2001. Lambda cyhalothrin is a pyrethroid insecticide, and currently the most widely used replacement for carbofuran, which was federally banned, for *Lissorhoptrus oryzophilis* (rice water weevil) control in rice. Lambda cyhalothrin was not detected in water or sediment samples collected in 2001. DFG will have a final report of lambda cyhalothrin monitoring when it is completed.

Observations and Highlights of 2001 Rice Growing Season

Water management practices remained the same for water holding requirements for rice pesticides in 2001. The only change that occurred required CACs to inspect and record seepage observed during the season, and required growers to compact levees to prevent seepage from occurring (Appendix 2). The following observations from 2001 are summarized as follows:

- Peak detections of molinate and thiobencarb at CBD5 are associated with the rice pesticide application period, since adequate water holding times and subsequent legal water releases did not occur until the end of May.

- Molinate concentrations were lower in 2001 than in 2000 at CBD5. Peak concentrations were twice as high in 2000--on May 18 (22.0 ppb) and May 25 (21.2 ppb)--than in 2001.

- Thiobencarb concentrations were lower at CBD5 in 2001 than in 2000. Peak concentrations in 2000 were on May 18 (10.7 ppb) and May 25 (10.4 ppb)--about twice the peak concentrations as in 2001.

- Concentrations of molinate and thiobencarb at SRR-1 and SRR-2 were likely a combination of pesticide drift, seepage, and legal water releases that occurred after holding times were met.

- Concentrations of molinate and thiobencarb in 2001 were higher at SRR-1 than in 2000.

- Concentrations of molinate and thiobencarb were highest in SRR-2. SRR-2 is located upstream of the American River confluence and does not receive the additional mixing of the American River as does the City of Sacramento.

- In 2001, propanil concentrations at CBD5 were higher than in 1998. Total treated acres were 300,595 compared to 84,500 acres treated in 1998.

- Propanil was not monitored in 1998 at BS1 or SR1. There were five detections of propanil between June 5-July 3, 2001, at BS1. The highest concentration at BS1 was 1.45 ppb on June 19. At SR1, propanil was detected once at 0.068 ppb on July 3, 2001.

- Aquatic toxicity data indicates a 48-hour LC_{50} value of 140 ppb for *Daphnia magna* to propanil. No drinking water quality criteria have been established for propanil.

- In 2001 at CBD5, there were 18 detections of triclopyr between May 29-July 26, 2001. The highest concentration (5.28 ppb) occurred on June 21. Detections of triclopyr were lower at CBD5 in 2001 than in 1998, the last time triclopyr was monitored at CBD5. Triclopyr was not monitored in 1998 at BS1 or SR1.

- In 2001,triclopyr was detected seven times at BS1, with the highest concentration (2.12 ppb) on July 3.

- Triclopyr was detected six times at SR1 from June 19-July 24, 2001. The highest concentration was on July 10 (1.56 ppb).

- Aquatic toxicity data indicates a 48-hour LC_{50} value of 132 ppm for *Daphnia magna.* No drinking water quality criteria have been established for triclopyr.

- Remaining stocks of carbofuran were to be used in 2000 due to the U.S. Environmental Protection Agency (U.S. EPA) ban on its use. In 2001 water was monitored to ensure there

was no further use of carbofuran. There were no acres reported treated and no detections of carbofuran in water samples collected in 2001.

- CACs reported no emergency releases were granted in 2001.

- DPR received reports in 2001 that the Bolero 10G formulation of thiobencarb was resulting in observable dust from the material when applied. Concerns that this dust was drifting off site prompted meetings with DPR, the California Rice Commission, and Valent (registrant for Bolero®). Valent will be phasing out Bolero 10G in 2002. Bolero 15G is a new formulation of granular thiobencarb that will replace Bolero 10G. This new formulation is reported not to have the dust problem associated with the older formulation. In addition, Valent has agreed to encourage rice growers not to use the Bolero 10G in fields where adjacent waterways could be impacted by the dust.

- DPR is monitoring activities related to drift concerns. DPR continued its propanil monitoring activities on rice, specifically on the amount sold, the amount applied, and application and drift issues that occurred in 2001. DPR staff also assisted CACs in the seven counties of Butte, Colusa, Glenn, Placer, Sutter, Yolo, and Yuba with application permits.

  U.S. EPA's Office of Pesticide Programs released a draft Pesticide Registration (PR) Notice on improving pesticide product labeling. This PR Notice, *Spray and Dust Drift Label Statements for Pesticide Products*, was developed to inform pesticide applicators of the requirements to control off-target spray and dust drift. DPR will be submitting comments on the PR Notice to U.S. EPA soon.

  DPR is currently in the process of making changes to current drift regulations located in the California Code of Regulations. Changes include deleting outdated language, revising current regulation sections, and creating a new section on drift minimization. It is anticipated that changes to the California drift regulations will occur sometime in 2002, after the rice pesticide application season.

- Herbicide resistance is increasing in rice weeds in California. Researchers continue to educate growers about management practices to avert further development and spread of resistant weeds. This is done through annual meetings and a Rice Field Day which is sponsored by the California Cooperative Rice Research Foundation, U. S. Department of Agriculture, and University of California. New herbicides will be an integral part of weed resistance management, coupled with strategies that avoid alternate use of herbicides with similar modes of action.

- DPR continues to encourage development and adoption of reduced risk measures in rice culture through its pest management alliances and pest management grants. In 2001 DPR awarded an Integrated Pest Management Innovator Award to Lundberg Family Farms in Richvale, California. An estimated 70 percent of rice farmed by Lundberg Family Farms is organically farmed and low rates of reduced-risk herbicides are used only when necessary.

- Thiobencarb concentrations did not exceed the primary MCL of 70 ppb established by U.S. EPA, or the secondary action level due to off-taste of 1.0 ppb for thiobencarb in 2001, established by the California Department of Health Services. However, thiobencarb exceeded 0.34 ppb which was the level CVRWQCB specified in its 2000 resolutions as a target level to cause further review of the water management practices for thiobencarb that currently exist. The City of Sacramento reported taste complaints were received in May and June of 2001.

- Molinate detections did not meet or exceed the MCL (20.0 ppb) established by U.S. EPA during 2001.

- The California Rice Commission is working with Valent in a stewardship program to place the old Bolero 10G formulation in areas that will decrease impact to waterways while this formulation is being phased out.

- The California Rice Commission will be initiating a Rice Pesticide Stewardship Communications Outreach Plan with the Coalition for Urban/Rural Environmental Stewardship regarding pesticide drift. The plan's goals are to inform rice growers, pest control advisers, crop consultants, applicators, and federal/state regulators about stewardship practices that allow for safe and effective use of rice pesticides.

- DPR will continue to work and improve communication with the cities of Sacramento and West Sacramento regarding drinking water concerns related to the presence of rice pesticides. DPR staff are committed to increase submittals of data to the cities during the rice season as quickly as data can be checked for accuracy and quality control.

We are concerned about the elevated levels of thiobencarb at SRR-1 in May of last year. While we are not proposing any additional regulatory measures to address this potential problem during 2002, we anticipate that the phaseout of the older thiobencarb formulation will reduce the concentration of this pesticide in the Sacramento River. We will be closely monitoring the trend for this pesticide in 2002, and will propose additional controls on it if concentrations continue to increase.

We will continue to work with your Board, as well as with the many other organizations that are cooperating, to monitor and mitigate any water quality impacts from rice production and the associated pesticide uses.

I recommend the Board approve the proposed Rice Pesticides Program for 2002. The Rice Pesticides Program remains an example of how state agencies and stakeholders are cooperating to reach our common goal toward protecting water quality.

If you have any question, please contact KayLynn Newhart, Associate Environmental Research Scientist, at (916) 324-4190.

Attachment

cc: KayLynn Newhart

ENVIRONMENTAL MONITORING
RICE PROGRAM

Information on Rice Pesticides
Submitted to the California Regional Water Quality Control Board
December 31, 2001

By

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Introduction

The Department of Pesticide Regulation (DPR) implemented the Rice Pesticides Program in 1983 to reduce discharges into surface waterways of the rice herbicides molinate (Ordram®) and thiobencarb (Bolero® and Abolish®). In 1990, the objectives of these control efforts were expanded, following the adoption of amendments to the Central Valley Regional Water Quality Control Board's (CVRWQCB) Water Quality Control Plan (Basin Plan). This plan established performance goals for molinate and thiobencarb beginning in 1990, and the insecticides methyl parathion, and malathion beginning in 1991.

Water samples are collected yearly during the rice pesticide application period (typically from April-July) at the Colusa Basin Drain at Highway 20 (CBD5) in Colusa County, Butte Slough at Lower Pass Road (BS1) in Sutter County, and from a site on the Sacramento River at the Village Marina (SR1). In addition, the City of Sacramento monitors for the presence of molinate and thiobencarb at the City of Sacramento drinking water intake (SRR-1) during the same time period. Additionally in 2001, water samples were collected at the City of West Sacramento's drinking water intake SRR-2 (figure 1) and analyzed by the City of Sacramento's Water Quality Laboratory due to a cooperative agreement between the two cities.

The following summary describes the factors affecting the presence of molinate, thiobencarb, methyl parathion, and malathion in agricultural drains and the Sacramento River and DPR's efforts to meet the performance goals in 2001. Other rice pesticides discussed include propanil (Propanil-4®, Wham E-Z®, Super Wham®), triclopyr (Grandstand®), Diflubenzuron (Dimilin®), lambda cyhalothrin (Warrior®), and herbicides that are proposed for possible future registration in California for use on rice.

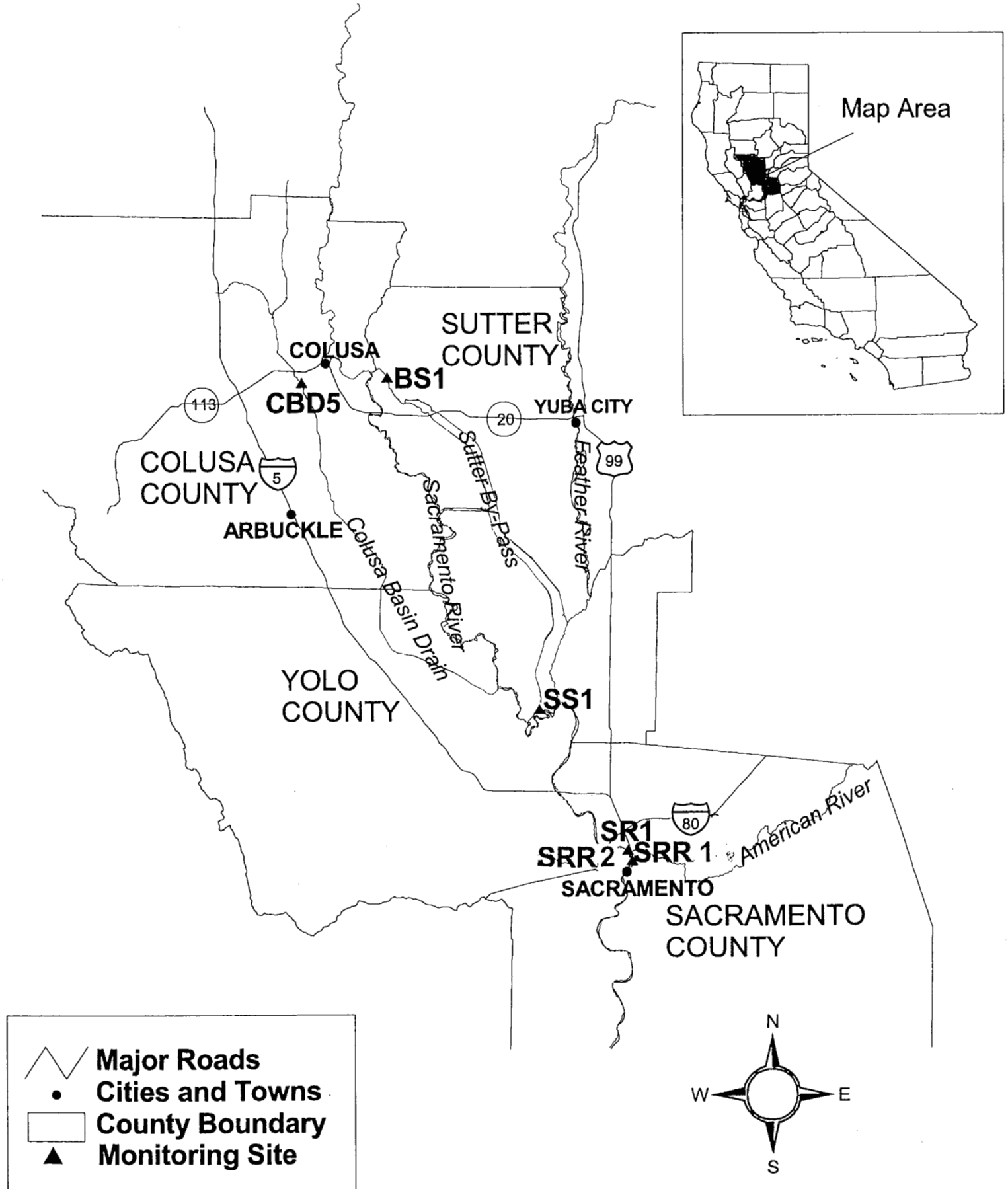
REVIEW OF 2001 RICE PESTICIDES PROGRAM

County agricultural commissioners (CACs), with the use of restricted materials permits, implemented program requirements for molinate, thiobencarb, methyl parathion, and malathion in 2001. A description of the 2001 rice pesticide program requirements can be found in the guidelines provided to the CACs by the Director of DPR in a memorandum dated March 8, 1995 (Appendix 1). Additional permit conditions were added for seepage control in 2001. The remaining permit conditions were determined adequate for use in 2001 and were unchanged.

Water Hold Requirements

Rice growers are required to hold water on their fields following application of rice pesticides (Appendix 2), which have been shown to be toxic to aquatic organisms. Holding periods allow for degradation of pesticides to occur, reducing concentrations contained in rice field runoff that enters waterways adjacent to treated fields. The standard molinate holding period remained 28 days. The holding period for granular thiobencarb (Bolero®) remained 30 days, and for liquid thiobencarb (Abolish®), remained 19 days in the Sacramento Valley. Reduced holding periods are allowed for molinate and thiobencarb when they are applied in water-short areas, when closed water management systems are used, in hydrologically isolated fields that do not enter adjacent waterways. The holding

Figure 1. Pesticide monitoring sites in the Sacramento Valley



period for rice fields treated with methyl parathion remained 24 days. Shorter water holding periods are allowed for growers utilizing closed water systems when treated with methyl parathion. The water holding period for malathion remained four days.

DESCRIPTION OF 2001 COOPERATIVE WATER QUALITY MONITORING PROGRAM

The California Rice Commission contracted with the Kleinfelder, Inc., Sacramento, California, to collect water samples from CBD5 in Colusa County, BS1 in Sutter County, and SR1 on the Sacramento River. The sample collection methods, monitoring protocol, and laboratory plan for 2001 rice pesticide monitoring are in appendix 3.

Rice Pesticide Use in 2001

CACs located in rice growing counties of the Sacramento Valley keep records of pesticides applied to rice acreage with the use of Notices of Intent (NOIs) and Notices of Application (NOAs). Rice growers submit NOIs to the CACs at least 24 hours prior to application so that CAC staff can observe applications. NOAs are reported 24 hours after application occurs in order that water holding times can be recorded, inspected, and tracked.

There were 494,130 acres of rice planted in the Sacramento Valley in 2001 (figure 2). This represented a decrease of 78,471 from 574,601 acres planted in 2000. Weed pressures continued to be high in 2001 due to weather and factors that affect weed populations.

There were 217,250 acres reported treated with molinate in 2001, compared to 268,219 acres treated in 2000 Sacramento Valley-wide. Thiobencarb use decreased from 240,116 acres in 2000 to 181,037 acres treated in 2001. Propanil was reported applied to 300,595 acres only slightly lower than 306,780 acres reported in 2000 (Table 1). Triclopyr treated acres were 197,202 acres compared to 255,219 acres treated in 2000. Lambda cyhalothrin was reported applied to 94,513 acres compared to 89,260 treated in 2000. Diflubenzuron use increased from 3,794 acres reported treated in 2000 to 12,114 acres treated in 2001 (Table 2).

Figure 2. Rice growing counties of the Sacramento Valley and total rice acreage planted in 2001.

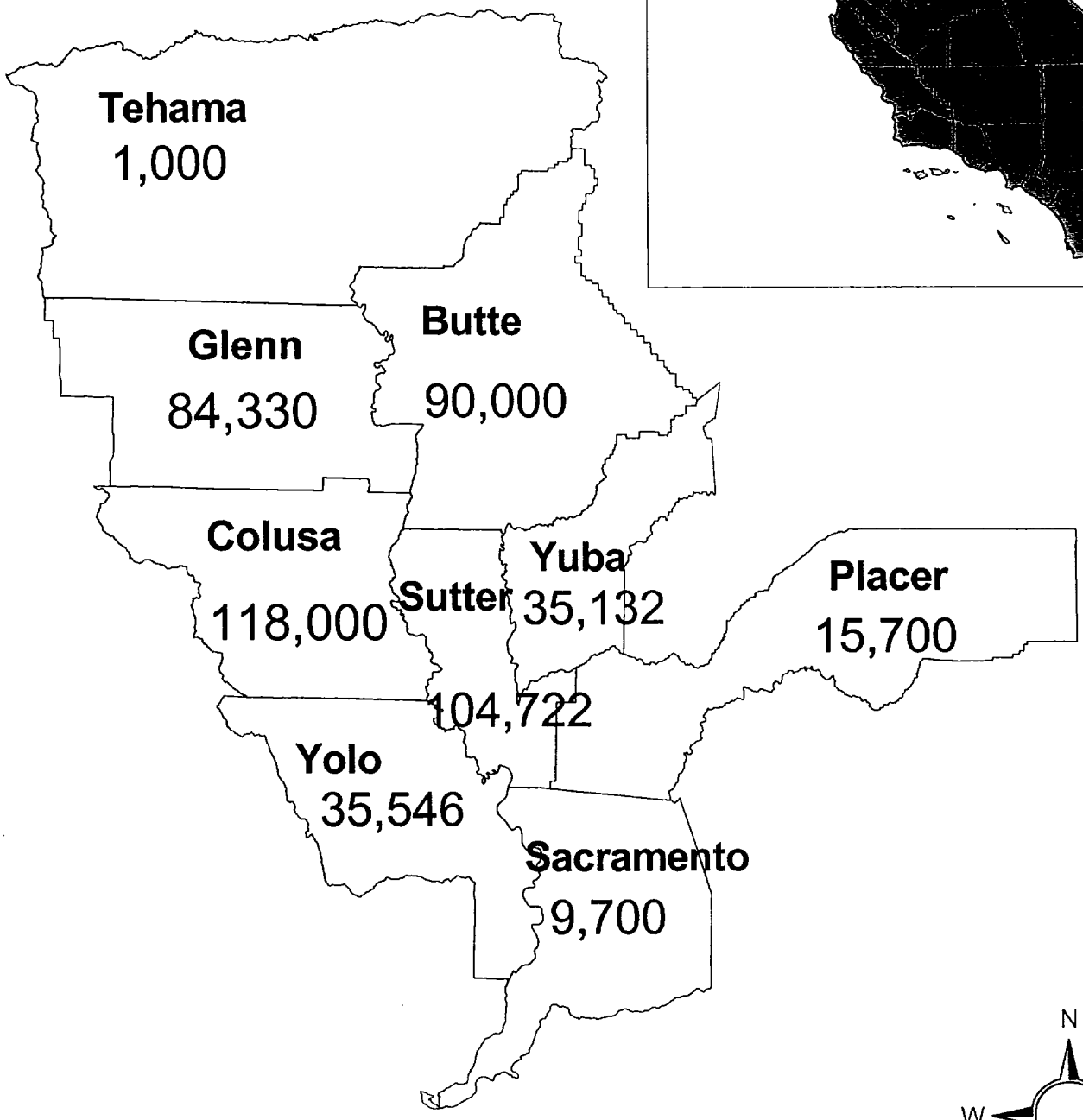


Table 1. Acres treated with molinate (Ordram®), thiobencarb (Bolero®/Abolish®), carbofuran (Furadan®), methyl parathion, malathion, and propanil (SuperWham®,Wham EZ®, Stam®) based on Notices-of-Application (NOA) in the rice growing counties in the Sacramento Valley during 2001.

Acres Treated						
County	**Molinate**	**Thiobencarb**	**Carbofuran**	**Methyl Parathion**	**Malathion**	**Propanil**
Butte	42,089	40,239	0	0	0	65,925
Colusa	42,862	63,071	0	0	0	69,295
Glenn	39,598	32,934	0	0	0	67,305
Placer	8,524	988	0	0	0	7,636
Sacramento	945	5,554	0	0	0	4,655
Stanislaus	1,176	594	0	0	0	2,400
Sutter	50,183	21,621	0	0	498	53,634
Tehama	0	0	0	0	0	0
Yolo	7,209	13,520	0	0	238	11,598
Yuba	24,664	2,515	0	0	444	18,147
				0		
Totals	**217,250**	**181,037**	**0**	**0**	**1,180**	**300,595**

Table 2. Acres treated with triclopyr (Grandstand®), lambda cyhalothrin (Warrior®), diflubenzuron (Dimilin®), carfentrazone (Shark®), and cyhalofop-butyl (Clincher CA®) based on pesticide use reporting data in rice growing counties of the Sacramento Valley in 2001.

Acres Treated				
County	**Triclopyr**	**Lambda cyhalothrin**	**Diflubenzuron**	**Cyhalofop butyl***
Butte	32,881	19,042	3,592	6,288
Colusa	62,208	27,670	552	
Glenn	40,347	11,260	2,087	
Placer	1,287	545	1,112	3,266
Sacramento	3,754	1,152	263	1,026
Sutter	39,254	29,282	2,257	10,556
Stanislaus	53	419	0	
Tehama	0	0	0	
Yolo	13,362	506	0	
Yuba	4,056	4,637	2,251	
Totals	**197,202**	**94,513**	**12,114**	**21,136**

*** Blanks indicate pending application report data not yet submitted to DPR.**

Sampling and Analytical Regimen for 2001

Water samples were collected from all sampling sites during the rice pesticide application time period based on when applications began. Background water samples were collected on April 3 and sampling began for carbofuran, methyl parathion, and malathion on April 24 at all sampling sites. Sampling for thiobencarb and molinate began on May 1 at all sampling sites (Table 3 through Table 5). Propanil monitoring began May 8 (Table 6) and triclopyr monitoring began May 22 (Table 6) at all sampling sites.

Primary water samples were delivered to Syngenta, manufacturer of Ordram, for molinate analyses. Primary water samples were delivered to Valent, the primary distributor of thiobencarb. Primary water samples were analyzed by CDFA laboratory for methyl parathion, malathion, triclopyr, propanil, and carbofuran. Additional samples representing ten percent of primary samples collected were analyzed for quality control (QC) purposes. Molinate, thiobencarb QC analysis were performed by CDFA laboratory. DFG laboratory performed QC analysis for carbofuran, propanil, and triclopyr. PTRL West Laboratory performed QC analysis for methyl parathion and malathion. Additional samples were collected and stored for analyses in cases where confirmations of analytical results might have been required. Blind spikes were also submitted periodically for analyses with field samples for quality control purposes.

Lambda cyhalothrin is a replacement for carbofuran used for the control of *Lissorhoptrus oryzophilus* (rice water weevil) on rice. Warrior® can be applied up to three applications per season at a rate of 0.03-0.04 pounds active ingredient per acre over the entire rice field. Fish toxicity can occur at 0.21-0.81 ppb and the LC_{50} for the aquatic invertebrate *Daphnia magna* (waterflea) is 0.36 ppb. Lambda cyhalothrin is a pyrethroid insecticide, is hydrophobic, and binds readily to organic matter. Uncertainty exists regarding bioavailability and bioaccumulation in aquatic organisms, and sediment accumulation. Acute toxicity and off-target drift are concerns with wide spread use. Sample collection and laboratory methods that exist for detecting lambda cyhalothrin are very difficult due to the hydrophobic nature of the chemical and tendency to adhere to equipment used for collecting samples. This presents added complication to field collection of samples and laboratory procedures for analysis of the chemical.

DFG performed monitoring and analysis of water and sediment at various locations adjacent to Warrior® applications. The California Rice Commission located cooperative rice growers and participated in planning efforts for the study. DPR provided field staff assistance in the collection of samples. There were no detections of lambda cyhalothrin in water or sediment samples collected in 2001. A final report of DFG monitoring for lambda cyhalothrin in 2001 will be available when completed.

Toxicity Testing

Water samples were collected for nine weeks at CBD5 from April 24 through June 26. DFG Aquatic Toxicology laboratory staff conducted acute tests on neonate (<24 hours old) cladocerans (*Ceriodaphnia dubia*) to sample water for 96 hours and to control and blind spiked water samples. Percent survival was a measurement for presence of toxicity in water. Samples were also analyzed for

conductivity, total alkalinity, total hardness, and dissolved oxygen. The toxicity tests were conducted following ATL-SOP-012 based on the general guidelines of EPA/600/4-90/027F. Monitoring results are included in tables 3, 4, and 5 and can be summarized a follows:

CBD5 Monitoring Results (Table 3 and Table 6)

- Molinate was detected above the performance goal (10.0 ppb) on May 8, May 15 (12.1 ppb), May 24 (12.7 ppb). Seventeen detections of molinate occurred from May 1-June 26.
- Molinate concentrations were lower in 2001 than in 2000 at CBD5. Peak concentrations were twice as high in 2000, on May 18 (22.0 ppb) and May 25 (21.2 ppb) than in 2001.
- Thiobencarb was detected above the performance goal (1.5 ppb) during eleven sampling events beginning May 8-June 12. Eighteen detections of thiobencarb occurred from May 1-July 12.
- Thiobencarb concentrations were lower in 2001 than in 2000 at CBD5. Peak concentrations of thiobencarb at CBD5 in 2000 were on May 18 (10.7 ppb) and May 25 (10.4 ppb) almost twice the peak concentrations as in 2001.
- A single detection of malathion was detectected on May 10 of 0.0528 ppb. The performance goal for malathion is 0.1 ppb.
- There were no detections of carbofuran or methyl parathion.
- Fifteen detection of propanil occurred between May 29-July 19. The highest detection was reported at 20.6 ppb on May 29 (table 6).
- Eighteen detections of triclopyr occurred between May 29-July 26. The highest detection (5.28 ppb) occurred on June 21 (table 6).
- Peak detections of molinate and thiobencarb at CBD5 are associated with the rice pesticide application period, since adequate water holding times and subsequent water releases did not occur until the end of May (figures 3 and 4).

BS1 Monitoring Results (Table 4 and Table 6)

- Molinate was detected seven times from May 15-June 26 and exceeded the performance goal on May 29 (17.1 ppb) and June 5 (11.2 ppb).
- Molinate detections were similar in 2001 and 2000. The peak detection in 2001 (17.1 ppb) was higher than the peak detection (11.5 ppb) in 2000.
- Thiobencarb was detected three times between May 22 and June 5. The performance goal (1.5 ppb) was exceeded on May 29 (2.6 ppb) and June 5 (1.5 ppb).
- Thiobencarb concentrations were similar in 2001 and 2000. The peak detection in 2001 was slightly higher than the peak detection in 2000 (1.6 ppb).
- There were no detection of carbofuran, methyl parathion, or malathion at BS1.
- There were five detections of propanil between June 5 and July 3. the highest concentration was 1.45 ppb on June 19 (table 6).
- There were seven detections of triclopyr between June 12 and July 24. The highest concentration was 2.12 ppb on July 3 (table 6).
- Peak detections of molinate and thiobencarb are mostly associated with the pesticide application period in early May (figures 5 and 6).

SR1 Monitoring Results (Table 5 and Table 6)

- Molinate was detected on May 22 (2.03 ppb) and May 29 at (2.12 ppb).
- In 2000, molinate was detected four times below the performance goal (10.0 pp) at SR1. The peak concentration of molinate in 2000 was 1.92 ppb.
- One detection occurred of thiobencarb on May 22 (0.50 ppb).
- There were no detections of thiobencarb in 2000 at SR1.
- There were no detections of carbofuran, methyl parathion, or malathion.
- Propanil (table 6) was detected one time on July 3 (0.0686 ppb).
- Triclopyr (table 6) was detected six times from June 19-July 24. The highest concentration occurred on July 10 (1.56 ppb).

Table 3. 2001 Pesticide Concentrations at the Colusa Basin Drain near Highway 20 in Colusa County (CBD5) in parts per billion (ppb).

	Molinate		Thiobencarb		Carbofuran		Methyl Parathion	Malathion
Sample Type	Primary	QC	Primary	QC	Primary	QC	Primary	Primary
Reporting limit (ppb)	1.0	0.5	0.5	0.5	0. 35	0.05	0.05	0.05
Date								
3-Apr	ND	ND	ND	ND	ND	ND	ND	ND
24-Apr	NA	NA	NA	NA	ND	NA	ND	ND
26-Apr	NA	NA	NA	NA	ND	ND	ND	ND
1-May	3.97	NA	0.80	NA	ND	ND	ND	ND
3-May	8.98	7.38	1.30	1.27	ND	ND	ND	ND
8-May	10.5	NA	5.1	NA	ND	NA	ND	ND
10-May	9.08	8.33	5.9	5.1	ND	ND	ND	0.0528
15-May	12.1	NA	2.2	NA	ND	NA	ND	ND
17-May	9.85	NA	2.7	NA	ND	ND	ND	ND
22-May	9.71	NA	4.8	NA	ND	ND	ND	ND
24-May	12.7	NA	5.5	NA	ND	ND	ND	ND
29-May	7.94	NA	4.0	NA	ND	NA	ND	ND
31-May	5.07	NA	3.0	NA	ND	ND	ND	ND
05-Jun	2.81	NA	2.1	NA	ND	NA	ND	ND
07-Jun	2.30	NA	1.6	NA	ND	ND	ND	ND
12-Jun	2.32	NA	1.6	NA	ND	NA	ND	ND
14-Jun	2.00	NA	1.4	NA	ND	ND	ND	ND
19-Jun	1.29	NA	1.1	NA	ND	NA	ND	ND
21-Jun	1.55	NA	1.2	NA	ND	ND	ND	ND
26-Jun	1.02	NA	0.8	NA	ND	NA	ND	ND

Samples collected by Kleinfelder, Inc. under contract with California Rice Commission.
Key to designations for rice water monitoring table for CBD5:

QC	Quality Control
ND	Not Detected
NS	Not Sampled
NA	Not Analyzed

PERFORMANCE GOALS(ppb):

molinate	10.0	carbofuran	0.4
thiobencarb	1.5	malathion	0.1
methyl parathion	0.13		

Table 3 con't. 2001 Pesticide Concentrations at the Colusa Basin Drain near Highway 20 in Colusa County (CBD5) in parts per billion (ppb).

	Molinate		Thiobencarb		Carbofuran		Methyl Parathion	Malathion
Sample Type	Primary	QC	Primary	QC	Primary	QC	Primary	Primary
Reporting limit (ppb)	1.0	0.5	0.5	0.5	0. 05	0.05	0.05	0.05
Date								
28-June	ND	NA	0.5	NA	ND	ND	ND	ND
3-Jul	ND	NA	ND	NA	NA	NA	NA	NA
5-Jul	ND	ND	ND	ND	NA	NA	NA	NA
10-Jul	ND	ND	ND	ND	NA	NA	NA	NA
12-Jul	ND	ND	ND	ND	NA	NA	NA	NA

Samples collected by Kleinfelder, Inc. under contract with California Rice Commission.
Key to designations for rice water monitoring table for CBD5:

QC	Quality Control	PERFORMANCE GOALS(ppb):			
ND	Not Detected	molinate	10.0	carbofuran	0.4
NS	Not Sampled	thiobencarb	1.5	malathion	0.1
NA	Not Analyzed	methyl parathion	0.13		

Figure 3: Acres treated with molinate in Colusa and Glenn Counties and concentrations of molinate in the Colusa Basin Drain near SR20 in 2001

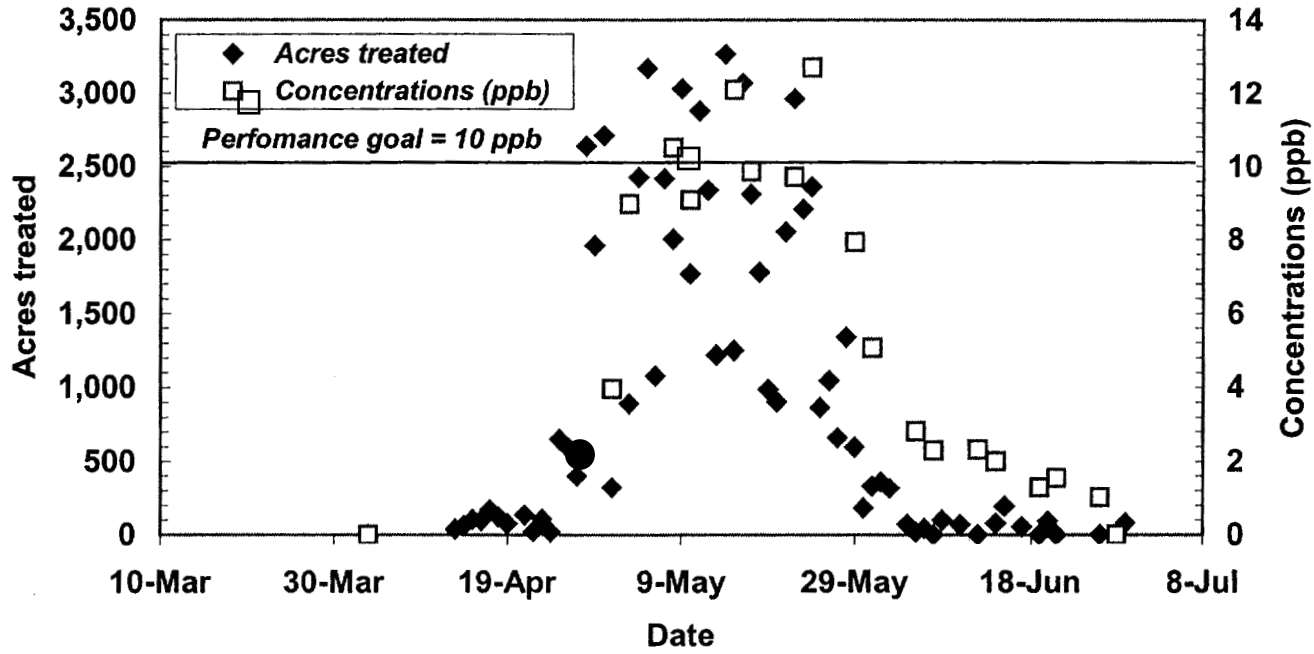


Figure 4: Acres treated with thiobencarb in Colusa and Glenn Counties and concentrations of thiobencarb in the Colusa Basin Drain near SR20 in 2001

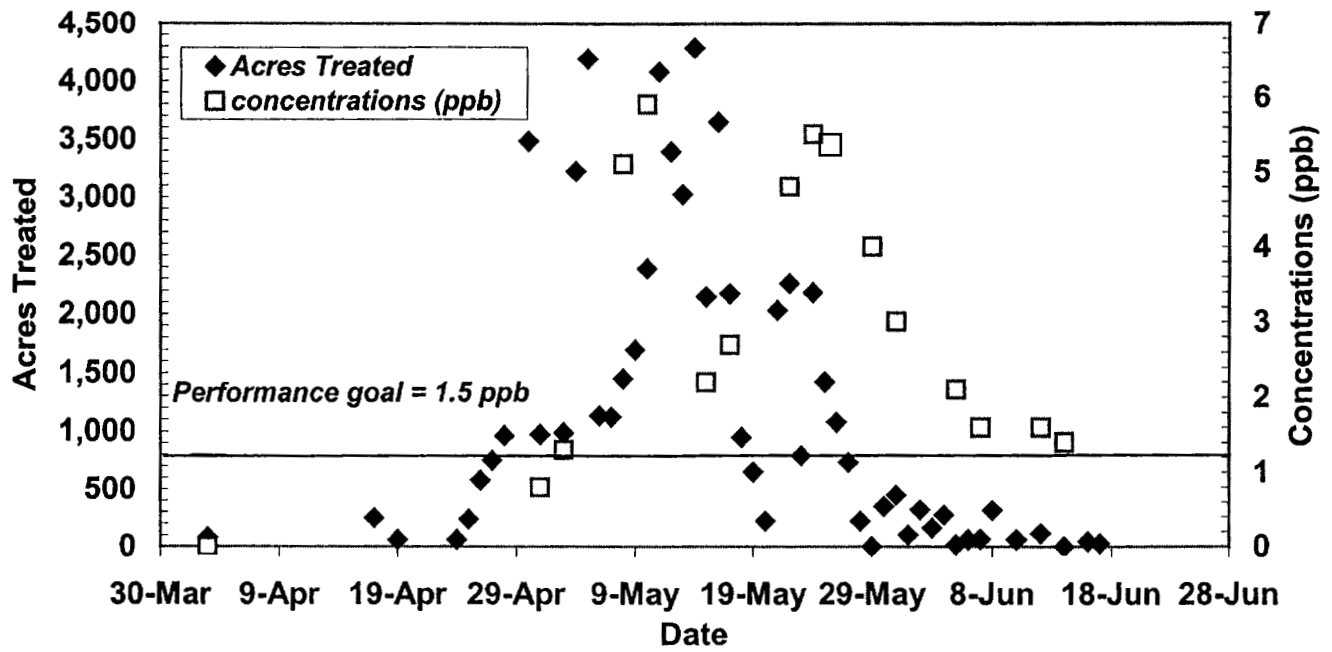


Table 4. 2001 Pesticide Concentrations at Butte Slough at Lower Pass Road in Sutter County (BS1) in parts per billion (ppb).

Sample type	Molinate	Thiobencarb	Carbofuran	Methyl Parathion	Malathion
	Primary	Primary	Primary	Primary	Primary
Reporting Limit (ppb)	1.0	0.5	0.35	0.05	0.05
Date					
3-Apr	ND	ND	ND	ND	ND
24-Apr	NA	NA	ND	ND	ND
1-May	ND	ND	ND	ND	ND
8-May	ND	ND	ND	ND	ND
15-May	2.43	ND	ND	ND	ND
22-May	9.66	0.80	ND	ND	ND
29-May	17.1	2.6	ND	ND	ND
5-Jun	11.2	1.5	ND	ND	ND
12-Jun	2.57	ND	ND	ND	ND
19-Jun	1.81	ND	ND	ND	ND
26-Jun	1.10	ND	ND	ND	ND
3-Jul	ND	ND	ND	ND	ND
10-Jul	ND	ND	NA	NA	NA

Samples collected by Kleinfelder, Inc. under contract with California Rice Commission.
Key to designations for rice water monitoring table for CBD5:

QC	Quality Control	PERFORMANCE GOALS(ppb):			
ND	Not Detected	molinate	10.0	carbofuran	0.4
NS	Not Sampled	thiobencarb	1.5	malathion	0.1
NA	Not Analyzed	methyl parathion	0.13		

Figure 5: Acres treated with molinate in Butte County and concentrations of molinate in Butte Slough in 2001

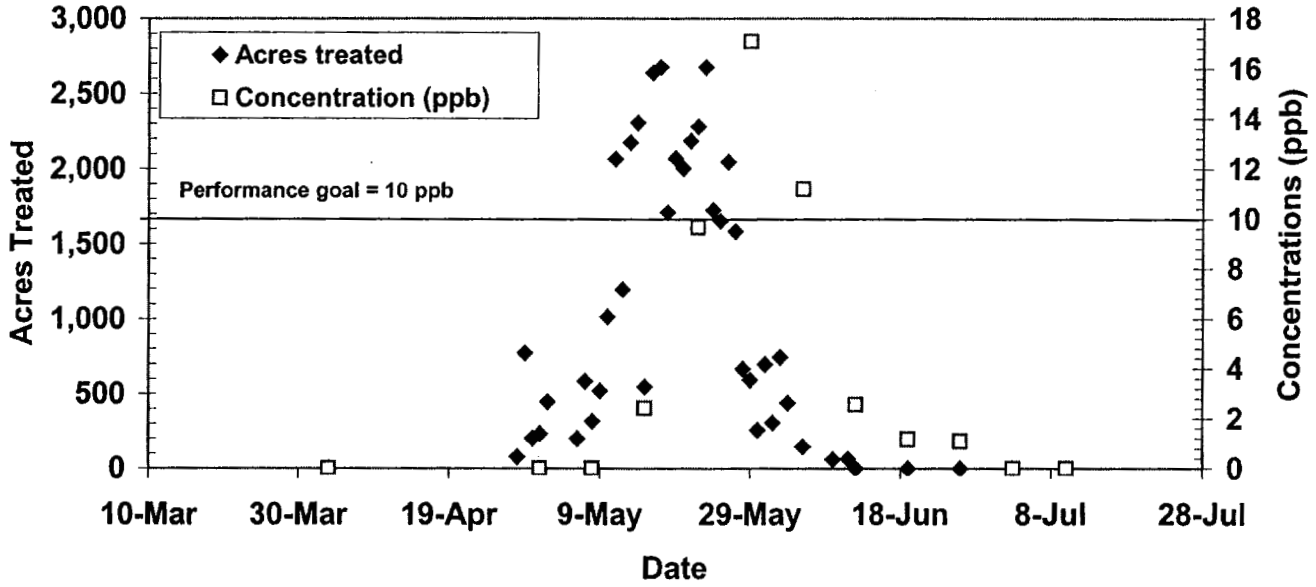


Figure 6: Acres treated with thiobencarb in Butte County and concentrations of thiobencarb in Butte Slough near SR20 in 2001

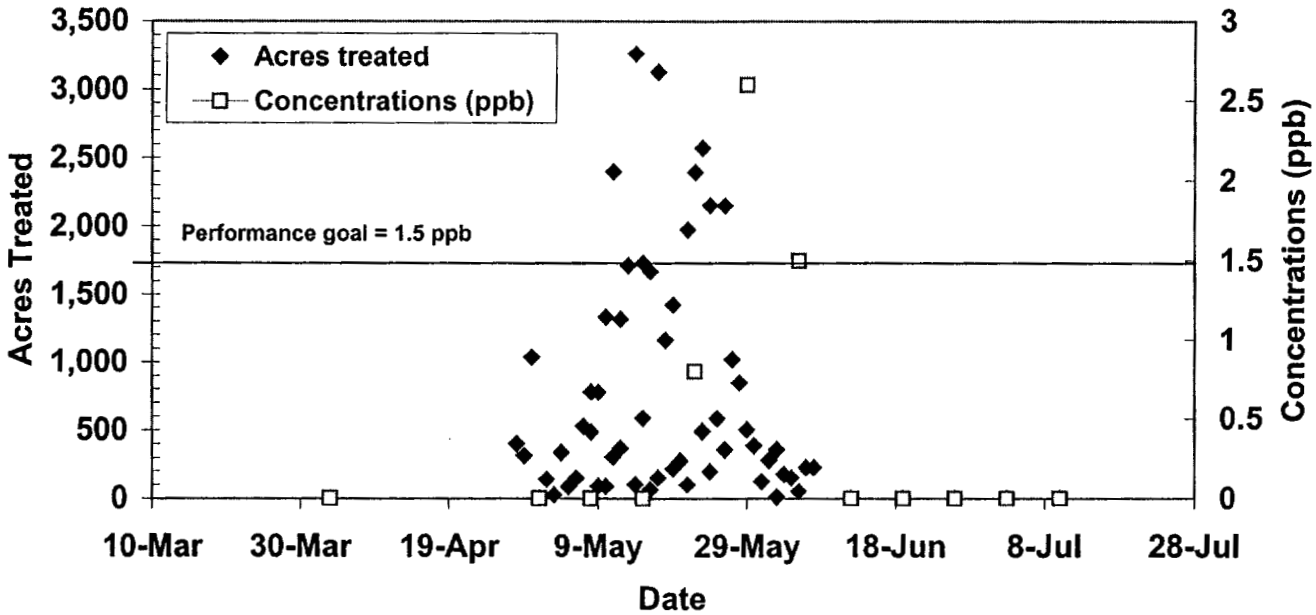


Table 5. 2001 Rice Pesticide Concentrations in the Sacramento River at the Village Marina in Sacramento County (SR1) in parts per billion (ppb).

	Molinate	Thiobencarb	Carbofuran	Methyl Parathion	Malathion
Sample type	Primary	Primary	Primary	Primary	Primary
Reporting Limit (ppb)	1.0	0.5	0.35	0.05	0.05
Date					
3-Apr	ND	ND	ND	ND	ND
24-Apr	NA	NA	ND	ND	ND
1-May	ND	ND	ND	ND	ND
8-May	ND	ND	ND	ND	ND
15-May	ND	ND	ND	ND	ND
22-May	2.03	0.50	ND	ND	ND
29-May	2.12	ND	ND	ND	ND
5-Jun	ND	ND	ND	ND	ND
12-Jun	ND	ND	ND	ND	ND
19-Jun	ND	ND	ND	ND	ND
26-Jun	ND	ND	ND	ND	ND
3-Jul	ND	ND	NA	NA	NA
10-Jul	ND	ND	NA	NA	NA

Samples collected by Kleinfelder, Inc. under contract with California Rice Commission.
Key to designations for rice water monitoring table for CBD5:

QC	Quality Control	PERFORMANCE GOALS(ppb):			
ND	Not Detected	molinate	10.0	carbofuran	0.4
NS	Not Sampled	thiobencarb	1.5	malathion	0.1
NA	Not Analyzed	methyl parathion	0.13		

Propanil and triclopyr were monitored at CBD5, BS1, and SR1 due to the increase in use of these herbicides observed in recent years (Table 6). These herbicides were monitored at CBD5 only in 1998. Propanil concentrations ranged from 0.32-5.87 ppb and the average concentration was 2.35 ppb in 1998. There were 84,500 acres treated with propanil in 1998. Propanil concentrations were higher in 2001 at CBD5 than in 1998. In 2001, propanil concentrations at CBD5 ranged from 0.07-20.6 ppb, and the average over the monitoring period was 3.89 ppb. There were 300,595 acres treated in 2001, a dramatic increase compared to 1998.

Concentrations of triclopyr were lower in 2001 than in 1998 at CBD5. In 1998, triclopyr concentrations ranged from 0.40-8.86 ppb, and the average concentration during the monitoring period was 4.46 ppb. There were 104,016 acres reported treated in 1998. In 2001, triclopyr concentrations ranged from 0.83-5.28 ppb at CBD5, and the average concentration during the monitoring period was 2.70 ppb. There were 197,202 acres reported treated in 2001.

Table 6. 2001 pesticide concentrations of propanil* and triclopyr* in part per billion(ppb) at CBD5, BS1, and SR1.

		Propanil			Triclopyr		
Laboratory sample type		Primary			Primary		
Reporting limit (ppb)		0.05			0.50		
	Sample Sites	CBD5	BS1	SR1	CBD5	BS1	SR1
Date							
3-Apr		ND	ND	ND	ND	ND	ND
24-Apr		NA	NA	NA	NA	NA	NA
26-Apr		NA	NA	NA	NA	NA	NA
1-May		NA	NA	NA	NA	NA	NA
3-May		NA	NA	NA	NA	NA	NA
8-May		ND	ND	ND	NA	NA	NA
10-May		ND	NA	NA	NA	NA	NA
15-May		ND	ND	ND	NA	NA	NA
17-May		ND	NA	NA	NA	NA	NA
22-May		ND	ND	ND	ND	ND	ND
24-May		ND	NA	NA	ND	NA	NA
29-May		20.6	ND	ND	1.66	ND	ND
31-May		.709	NA	NA	0.83	NA	NA
5-Jun		5.68	0.111	ND	1.82	ND	ND
7-Jun		7.25	NA	NA	3.15	ND	ND
12-Jun		5.23	0.708	ND	3.11	0.201	ND
14-Jun		6.46	NA	NA	3.44	NA	NA
19-Jun		2.75	1.45	ND	4.27	0.754	0.119
21-Jun		1.92	NA	NA	5.28	NA	NA
26-Jun		2.83	0.194	ND	4.05	0.801	0.162
28-Jun		0.431	NA	NA	4.20	NA	NA
3-Jul		0.414	0.591	0.0686	3.63	2.12	0.618
5-Jul		0.084	NA	NA	3.07	NA	NA
10-Jul		0.073	ND	ND	2.26	1.27	1.56
12-Jul		0.0667	NA	NA	2.01	NA	NA
17-Jul		ND	ND	ND	1.46	0.953	0.143
19-Jul		0.144	NA	NA	1.73	NA	NA
24-Jul		ND	ND	ND	1.36	1.09	0.132
26-Jul		ND	NA	NA	1.34	NA	NA

*No Maximum Contaminant Level (MCL) currently established.

Central Valley Regional Water Quality Control Board Monitoring

Additional sampling was conducted by the CVRWQCB during the 2001 monitoring in response to early detections that exceeded the CVRWQCB level of 0.34 ppb at the City of West Sacramento drinking water intake. Sample analysis was performed by the California Department of Food and Agriculture Laboratory (CDFA) and CVRWQCB California Laboratory Services (CLS).

Table 7. CVRWQCB monitoring results for molinate ans thiobencarb at selected monitoring locations in rice growing areas of the Sacramento Valley in 2001.

		CDFA	CDFA	CLS	CLS
Date	**Site**	**Molinate (ppb)**	**Thiobencarb (ppb)**	**Molinate (ppb)**	**Thiobencarb (ppb)**
29-May	Sacramento River Upstream of Colusa Basin Drain	0.930	ND	3.4	ND
29-May	Sacramento Slough at Karnak Pumping Plant	8.301	ND	14.0	ND
29-May	Colusa Basin Drain #1	13.95	4.65	27.0	7.9
29-May	American River	ND	ND	ND	ND
29-May	Feather River Upstream of Verona	0.622	ND	3.0	ND
29-May	Sacramento River at I-5 Boat Launch	1.27	ND	4.2	ND
29-May	SRR-1 (City of Sacramento split sample)	1.03	ND	5.4	ND
29-May	SRR-2 (City of West Sacramento split sample)	1.65	0.50	3.4	ND

CLS Laboratory does not routinely analyze for rice pesticides. CDFA Laboratory and the City of Sacramento data are similar in the recoveries that were observed for molinate and thiobencarb. Quality control analysis that accompanied CDFA Laboratory results was well within acceptable ranges of recovery. Quality control analysis was not submitted to DPR for CLS samples and there are questions regarding accuracy of the recovery data.

Toxicity Monitoring Results

Toxicity analysis resulted in one day of significant mortality (60%) of *Ceriodaphnia dubia* on May 29. Companion field monitoring samples indicated detections of thiobencarb at 4.0 ppb and molinate at 7.94 ppb. DFG recommended water quality criteria exist for molinate (13 ppb) and thiobencarb (3.1 ppb) when these compounds are found together due to additive aquatic toxicity that can occur. These criteria are maximum concentrations, twice the average concentrations, and provide a two-fold margin of safety. No other toxicity was observed on those days that toxicity was analyzed (table 8).

Table 8. Aquatic toxicity analysis results conducted by DFG Aquatic Toxicology Laboratory (ATL) on *Ceriodaphnia dubia* from April 3-June 26, 2001.

Date of Sample	Week of Monitoring Study	Sample Survival %	Control Survival %
3-April	Background Sample	95	100
24-April	1	85	100
1-May	2	95	100
8-May	3	85	100
15-May	4	95	100
22-May	5	90	100
29-May	6	40	100
5-June	7	100	100
12-June	8	90	100
19-June	9	100	100
26-June	10	95	95

City of Sacramento (SRR-1) Monitoring Results

In addition to DPR monitoring, the City of Sacramento monitors water for molinate and thiobencarb at the City of Sacramento drinking water intake located south of the American River confluence on the Sacramento River (Table 9). Some water mixing occurs from the American River at the Sacramento River confluence prior to the drinking water intake. The City of Sacramento records taste complaints, on a yearly basis, from people whose water source comes from SRR-1. In a typical year, the City of Sacramento receives an average of 2-3 taste complaints from water consumers. Most of the taste complaints occur about the same time thiobencarb is detected at the 0.1 ppb level according to City of Sacramento water quality engineers. The primary Maximum Contaminate Level (MCL) is 70 ppb and the secondary MCL is 1.0 ppb for off-taste for thiobencarb. The MCL for molinate is 20 ppb.

- Molinate was detected eight consecutive sampling days. The highest concentration of molinate detected was 1.4 ppb on May 29 (Table 9).

- Thiobencarb was detected on four consecutive sampling days and the peak concentration reached 0.38 ppb on May 29 (Table 9). This level exceeded the CVRWQCB's concentration of 0.34 ppb as described in *Resolution No. 5-01-074, Approval of the Management Practices Required by the Department of Pesticide Regulation's Rice Pesticide Program for the 2001-2003 Seasons* (appendix 4).

- Peak detections of molinate and thiobencarb at the Cities of Sacramento and West Sacramento drinking water intakes were likely a combination of pesticide drift, seepage, and legal water releases that occurred after holding times were met.

- Concentrations of molinate and thiobencarb were higher in 2001 than in 2000.

City of West Sacramento (SRR-2) Monitoring Results

In 2001, water samples were collected at the West Sacramento drinking water intake and analyzed by the City of Sacramento Water Quality Laboratory (Table 9). Historically, water monitoring for the rice pesticides has not routinely occurred and detection limits were much higher when analysis was performed. West Sacramento's drinking water intake is located upstream of the confluence of the American River (figure 2), and does not have additional mixing of water prior to the drinking water intake that occurs from the influence of the American River as in the case of the City of Sacramento. There is no evidence beyond simple dilution that accounts for 85% of the difference in observed and expected concentrations between City of Sacramento and West Sacramento drinking water intakes when statistical analysis is applied to the 2001 observed concentrations.

- Molinate was detected on eight consecutive sampling events from May 9-June 12 (Table 9). The highest detections occurred on May 21 (1.3 ppb), May 29 (1.7 ppb), and June 1 (1.4 ppb).

- Thiobencarb was detected four times between May 21 and June 1. The highest concentrations were on May 21 (0.59 ppb) and May 29 (0.45 ppb). These levels exceeded the CVRWQCB's concentration of 0.34 ppb as described in *Resolution No. 5-01-074, Approval of the Management Practices Required by the Department of Pesticide Regulation's Rice Pesticide Program for the 2001-2003 Seasons* (appendix 5).

- Concentrations at the West Sacramento drinking water intake (SRR-2) were higher than the City of Sacramento probably due to the location of SRR-2 being north of the confluence of the American River.

Table 9. 2001 rice herbicide monitoring results for molinate and thiobencarb reported by the City of Sacramento Division of Water, Water Quality Laboratory taken at the Sacramento River WTPIntake (SRR-1) and West Sacramento River WTP Intake (SRR-2), results in ug/L, (ppb).

City of Sacramento SRR-1				City of West Sacramento SRR-2	
Date	**MOLINATE (Ordram®)**	**THIOBENCARB (Bolero®, Abolish®)**	**% SACRAMENTO RIVER AT INTAKE**	**MOLINATE (Ordram®)**	**THIOBENCARB (Bolero®, Abolish®)**
9-May	0.28	<0.20	76.7	0.50	<0.20
16-May	0.64	0.20	75.9	0.56	<0.20
5-May	0.80	0.30	61.7	1.3	0.59
25-May	1.1	0.28	89.3	0.76	0.23
29-May	1.4	0.38	80.7	1.7	0.45
1-June	0.84	<0.20	79.6	1.4	0.32
8-June	0.47	<0.20	89.0	0.56	<0.20
12-June	0.31	<0.20	75.0	0.31	<0.20

The cities of Sacramento and West Sacramento want to ensure that drinking water is protected from rice pesticides. DPR is committed to responding to the cities concerns and working cooperatively with all stakeholders regarding water quality issues related to rice pesticides.

Seepage Control

Rice field water can move laterally through rice levees bordering rice fields when levees are not constructed in a manner that prevents water from seeping through. Often levee borrow pits commonly called "sweat ditches" are used to contain this water. When water becomes high enough it can flow into local agricultural drainage conveyances.

CVRWQCB expressed concerns in the 1998-2000 approval of the Rice Pesticide triennial review regarding DPR's voluntary seepage management program is not an approved practice if rice pesticides are contained in seepage water. Current program recommendations require securing weir boxes in rice fields with plastic and soil to a depth higher than the water level. At rice pesticide permit issuance, CACs provide rice growers with a handout entitled: *Closed Rice Water Management Systems* prepared by the United States Department of Agriculture with the University of California Cooperative Extension. Another brochure CACs provide to rice growers entitled: *Seepage Water Management-Voluntary Guidelines for Good Stewardship in Rice Production*, was cooperatively developed by the University of California, Davis-Department of Agronomy and Range Science, DPR, and University of California Cooperative Extension explaining the causes and voluntary activities

growers should use to prevent seepage (appendix 5). DPR hoped that grower education and voluntary efforts would eliminate the need for further regulatory efforts.
In 2001 DPR issued suggested permit conditions to the CACs of rice counties that stated, "Growers shall not allow water to seep through borders surrounding rice fields." CAC staff will check for seepage at the same time they do water holding inspections. CAC staff will notify growers of seepage situations and report the information to DPR. Permit conditions will also require compaction of borders surrounding rice fields" (Appendix 6).

Table 10. Results of seepage inspections reported to DPR performed by County Agricultural Commissioners staff during the 2001 rice growing season.

County	Number of Inspections	Number of Inspections Seepage Observed	Pesticide Applied
Butte	197	11	molinate
	167	3	thiobencarb
Colusa	104	0	molinate
	125	0	thiobencarb
Glenn	227	15	molinate
	162	5	thiobencarb
Sutter	211	14	molinate
	73	6	thiobencarb
Yolo	255	1	molinate
	0	0	thiobencarb
Stanislaus	6	0	molinate
	0	0	thiobencarb
Sacramento	141	0	molinate
	0	0	thiobencarb
Yuba	461	0	molinate
	0	0	thiobencarb

A total of 2,129 seepage inspections were reported out of 2,397 rice fields inspected for water holding compliance. There were 55 incidences of seepage observed. DPR will determine if further actions are necessary to respond to seepage as a contribution to rice pesticides detected in waterways.

Enforcement Activities in 2001

The CACs are responsible for enforcement of the rice pesticide program. The role of the CAC staff in regards to rice pesticides includes:

- Advises growers, pest control advisers, and pest control operators on proper use.
- Issues restricted material permits.
- Conducts pesticide use monitoring inspections.
- Evaluates emergency release variances.
- Reports rice pesticide use to DPR.

Before any pesticide on the list of California restricted materials may be applied, growers must obtain a permit from their CAC. The permits may specify conditions for use of the pesticide, including post-application water-holding requirements. A Notice-of-Intent must be filed with the CAC 24 hours prior to the application, providing the CACs with the option to observe the mixing, loading, and application of the material, thus enforcing regulations that pertain to pest control operations. Molinate, thiobencarb, carbofuran, and methyl parathion are currently California restricted materials; malathion is not. Permits that specify post-application water-holding requirements like those for the use of molinate, thiobencarb, and methyl parathion also require that the Notice of Application (NOA) be filed with the CAC within 24 hours after the application. NOAs are used to determine when water holding begins.

In 1998, DPR and the CACs implemented a Prioritization Plan and a Negotiated Workplan. Part of the plan included a negotiated number of water hold inspections. These plans allow the counties to set priorities within standard guidelines. Rice pesticide applications and water-hold inspection are ranked as "High Priority" inspections as the rice pesticides are restricted materials, and several rice pesticides are under special study by DPR. The county offices then receive partial reimbursement from DPR based on number of inspections completed.

In 2001, CACs staff of Butte, Colusa, Fresno, Glenn, Merced, Placer, Sacramento, San Joaquin, Stanislaus, Sutter, Tehama, Yolo, and Yuba counties inspected 2,397 rice fields for compliance water-holding compliance. Two non-compliances occurred and one resulted in Agriculture Civil Penalties (ACP) being issued. There were 438 mix/load inspections resulting in 44 non-compliances and one ACP was issued. There were 400 inspections of applications. A total of 21 ACPs were reported for all inspection observed.

Emergency Releases are generally limited to fields where an 11-day molinate hold has elapsed and circumstances beyond a conscientious grower's control lead to the need to release water. Growers granted such variances are instructed to drain water only to the extent necessary to restore a healthy growing environment for the rice seedlings. CACs reported that there were no emergency releases granted in 2001. CACs and rice growers have demonstrated success in utilizing emergency releases as a last resort in recent years.

DISCUSSION OF 2001 RICE SEASON

The most significant conditions that have occurred in 2001 affecting concentrations of rice pesticides entering adjacent waterways includes:

- Herbicide resistance contributing to shifts in herbicide selection and increased application rates.
- Heavy reliance on a few effective pesticides due to the limited number of available products registered for use on rice.
- The contribution of drift during rice pesticide application.
- Weather and management practices that do not encourage vigorous rice stands that can out compete weeds requiring increased herbicide use due to heavy weed pressure.

ONGOING ACTIVITIES RELATED TO SOURCES OF RICE PESTICIDES

Rice Herbicide Resistance

Herbicide resistant weeds are increasing in geographic area in the Sacramento Valley rice growing counties. University of California, Davis (UCD) researchers have identified areas where resistance is occurring and continue to identify new areas. Molinate, thiobencarb, fenoxaprop, bensulfuron-methyl, bispyribac-sodium, and cyhalofop-butyl are all rice herbicide active ingredients where known herbicide resistance has been identified. Herbicide resistance is now known to exist where weed biotypes develop resistance to the mode of action of herbicides. This is referred to as cross resistance, wherein weeds expressing resistance to an herbicide will also express resistance to other herbicides with the same mode of action.

Research conducted by UCD indicates that to avert growing herbicide resistance to old and new herbicides, rice growers will be required to rotate modes of action, combine herbicides, and implement growing strategies which can decrease herbicide use. It has been suggested that pesticide label language could be used to encourage these strategies. Rice growers have the example of Londax® (bensulfuron-methyl) to remind them of how quickly weed resistance can develop when relying on a single chemical strategy for weed control, nearly eliminating it's effective use. Research continues regarding cross and multiple resistance. Work also continues on developing submergence-tolerant and more competitive rice cultivars that can tolerate increased water depth for weed suppression. Rice growers are also encouraged to establish healthy rice stands and keep water as deep as possible during early rice establishment to help rice out-compete weeds.

Registration Status of Future Herbicides Not Currently Registered in California

Clincher® (cyhalofop-butyl) was available for use on a maximum of 50,000 acres under provisions of a Section 18 Emergency Exemption in 2001 in Butte, Placer, Sacramento, Sutter, and Yuba counties. The use of Clincher® was restricted to rice basins/checks where a history of Delayed Phytotoxicity Syndrome (DPS) existed and where infestations of bearded sprangletop density was one plant per square foot. Its use resulted in a drop in thiobencarb use in Yuba county from 11,881 acres treated in 2000 to 2,515 acres in 2001. Clincher® is a reduced risk herbicide and is much less toxic and persistant in water and soil than thiobencarb.

Regiment® (bispyribac-sodium) is a new United States Environmental Protection Agency (USEPA) registered herbicide also considered much less persistant and less toxic to aquatic invertebrates than other herbicides used on rice. It has been federally registered by the USEPA but still faces certain data requirements prior to registration in California. Neither of the new herbicides when used alone is effective against herbicide resistant watergrass. Both products are considered reduced risk herbicides, are used at low rates, and are less environmentally persistant than thiobencarb and molinate. Both Regiment® and Clincher® will be susceptible to weed resistance development.

Weed resistance to propanil has developed in foreign rice growing countries and in the southern United States. Researchers contend that had California not experienced a brief suspension of use in the late 1960's, due to off-target phytotoxicity damage to adjacent crops that, it would be likely that

resistance to propanil would already exist in the Sacramento Valley. Therefore, grower vigilance in rotation of herbicides will be important in delaying the development of weed resistance to propanil in California.

The availability of a wider array of herbicides will decrease reliance on herbicides such as propanil, molinate, and thiobencarb, thereby reducing the amount of these products currently used and help avert or delay increased weed resistance.

PROPOSED RICE PESTICIDES PROGRAM FOR 2002

Non-Regulatory Management Proposals

DPR commits to increasing data sharing with the Cities of Sacramento and West Sacramento during the rice pesticide application and monitoring period in 2002. Interim data provided by the participating laboratories will be communicated after its approval by the laboratories for release. In the past, data has been provided only when written analytical reports have been submitted to DPR.

In addition, the California Rice Commission will be conducting a Rice Pesticide Communications Outreach Plan with the Coalition for Urban/Rural Environmental Stewardship (CURES). The goal of the education and outreach is to inform rice growers, pest control advisors, crop consultants, applicators, and federal/state regulators about stewardship practices that allow for safe and effective use of rice herbicides, insecticides, and fungicides in the rice production region of the Sacramento Valley while minimizing impacts to sensitive areas. The participants will develop materials that describe best management practices that can protect sensitive areas around rice growing areas. Various media and outreach programs will be used to distribute materials.

California Rice Commission and Valent will work on a stewardship program to phase out Bolero 10G and replace it with a less dusty formulation of Bolero 15G. Old stocks of Bolero 10G will be utilized in areas that are less likely to affect adjacent agricultural drains and the Sacramento River.

Regulatory Proposals

DPR proposes no major regulatory program changes for the 2001. The memorandum (Appendix 1) contains the description of the program to CACs. The program will continue to use restricted material permits and associated conditions to implement water management practices as a means to mitigate concentrations of rice pesticides in waterways adjacent to rice culture.

Program Elements

Water Holding Requirements

The current water holding reqirements are considered adequate for degrading pesticides held on rice fields to acceptable levels, prior to releasing water for the 2001-2003 rice seasons. Therefore, water holding times will not change for molinate, thiobencarb, methyl parathion, and malathion. Carbofuran was not reported used and was not detected in any water samples in 2001. Rice growers in one of the

several hydrologically-isolated areas may request the CAC to evaluate, on a case-by-case basis, whether discharges of water will flow into perennial streams.

DPR is currently evaluating whether a longer holding period would further dissipate rice pesticides and whether rice crops would be adversely impacted by these longer holding periods. This evaluation will be submitted as a separate report sometime in 2002.

Drift Control for Rice Pesticides

DPR continued its propanil monitoring activities on rice, specifically on the amount sold, the amount applied, and application and drift issues that occurred in 2001. DPR staff also assisted CACs in the seven counties of Butte, Colusa, Glenn, Placer, Sutter, Yolo, and Yuba counties with application permits.

USEPA's Office of Pesticide Programs (OPP) released a draft Pesticide Registration (PR) Notice on improving pesticide product labeling. This PR Notice, *Spray and Dust Drift Label Statements for Pesticide Products*, was developed to inform pesticide applicators of the requirements to control off-target spray and dust drift. DPR will be submitting comments on the PR Notice to the U.S. EPA before the end of 2001.

DPR is currently in the process of making changes to current drift regulations located in the California Code of Regulations. Changes include deleting out-dated lanquage, revising current regulation sections, and creating a new section on drift minimization. It is anticipated that changes to the California drift regulations will occur sometime in 2002, after the rice application season.

Seepage

DPR staff are evaluating the seepage inspections performed in 2001 and will determine if further action is necessary to address this problem.

Emergency Release Provisions

Emergency release provisions will not change for the 2002 rice season. Rice growers and CACs have demonstrated they utilize emergency releases only as a last resort, demonstrating an improvement in water management. Detailed emergency release provisions are in Appendix 2.

Enforcement

CACs and DPR enforcement will continue enforcement activities that include issuing restricted material permits; inspecting pesticide mixing, loading, and application; inspecting and tracking water holding requirements; and enforcing existing provisions of the rice pesticide program.

Monitoring

DPR will continue to assume the responsibility of planning and implementing the rice pesticides monitoring program. The California Rice Commission will again support this program through

retention of a consultant to collect water samples. DPR will continue to evaluate environmental hazards of proposed pesticides for use on rice in California and determine whether monitoring for these compounds is warranted on an as needed basis when environmental hazards are evaluated.

The rice industry and DPR are discussing other regulatory and nonregulatory actions that can be implemented for the 2002 rice season that would further reduce the impact of rice pesticides on water quality.

APPENDIX 1

California Environmental Protection Agency
James M. Strock, *Secretary for Environmental Protection*

State of Californi
Pete Wilson, *Govern*

DEPARTMENT OF PESTICIDE REGULATION
James W. Wells, *Director*

1020 N Street, Room 100
Sacramento, California 95814-5624

March 8, 1995

TO: COUNTY AGRICULTURAL COMMISSIONERS
IN RICE-GROWING COUNTIES OF THE SACRAMENTO VALLEY

SUBJECT: 1995 RICE PESTICIDES PROGRAM

On January 27, 1995, the Central Valley Regional Water Quality Control Board (CVRWQCB) approved management practices that limit discharges of the rice pesticides molinate (Ordram®), thiobencarb (Bolero® and Abolish®), carbofuran (Furadan®), methyl parathion, and malathion to surface waters. The CVRWQCB staff sent you a copy of the agenda item for this meeting along with a report prepared by my staff entitled: "Information on Rice Pesticides Submitted to the Central Valley Regional Water Quality Control Board" (December 28, 1995). This letter contains details on the 1995 rice pesticide program including conditions you are asked to implement for rice pesticide permits.

Most of the provisions of the rice pesticide program relating to routine water-holding times will remain the same as in 1994. However, changes will apply for regions previously considered hydrologically isolated to ensure compliance with the CVRWQCB's prohibition of acutely toxic discharges to waters that support aquatic habitat.

In addition, the CVRWQCB approved management plans to promote an educational effort with the rice-growing community that stresses the continued importance of drift prevention and introduces the potential contributions seepage water makes to the pesticide concentrations in the agricultural drains. Drift control provisions remain as they were in 1994. Continue to have your staff impress upon commercial applicators the need to better control applications of pesticides near agricultural drains and focus additional enforcement efforts, when possible, on aerial applications made to fields adjacent to agricultural drains. My

staff is working with representatives from the rice-growing community to propose voluntary measures growers might take to prevent rice field seepage water from entering surface waterways prior to the end of the required holding periods for field water. Your assistance in distributing forthcoming information to growers on seepage water containment will be appreciated.

The key features of the 1995 program are as follows:

1. The basic water management requirements for users of those pesticides that require permits (molinate, thiobencarb, methyl parathion, and carbofuran) are the same as in 1994. The water management requirements for the 1995 program as approved by the CVRWQCB are outlined in Attachments 1-4. Holding times for all applications (not just the "preflood surface" applications) of Abolish decreased to 19 days. Areas considered hydrologically isolated must hold water from fields treated with molinate and thiobencarb for longer periods (11 and 19 days, respectively) than previously required. Exceptions for some fields treated with thiobencarb are described in Attachment 2.

2. The water management practices following malathion use in rice are still voluntary. Attachment 5, which describes these practices, was designed to be distributed to growers.

3. Management practices for containing seepage water from rice fields and the pesticides this water may contain will be addressed through forthcoming educational measures and implemented through voluntary efforts by growers.

4. Water management practices within closed systems remain the same for 1995. The Department of Pesticide Regulation (DPR) will conduct a study on toxicity of water in multigrower closed systems to determine any need for longer holds in future years.

5. The emergency release provisions remain the same as in 1994 to continue to meet the CVRWQCB's prohibition of acutely toxic discharges to waters that support aquatic habitat. Growers with fields treated with Ordram may apply for an emergency release after a minimum holding period of 11 days. Fields will be prohibited from using the emergency release management option until the standard holding times for the insecticides have elapsed. Fields treated with Bolero do not qualify for the emergency release option. Attachment 6 is the form which permittees are to fill out as part of their request for an emergency release. Those that are granted an emergency release must also fill out an additional form (Attachment 7) and deliver it to your office. Failure to submit this form will be considered a permit violation. DPR staff will request the information on the completed forms later this summer.

6. Growers using the emergency release provision more than once or cited for water holding violations more than once must make improvements in water management capabilities. Such improvements will be required as conditions on future pesticide use permits and may include retention basins, ponds, or tailwater recovery systems.

7. Drift control provisions will again be an important part of the program. Methyl parathion application provisions are the same as in 1994. They include the use of an effective drift control agent, use of D8 nozzles, wind speeds $\leq$ 5 miles per hour, and a 300-foot downwind buffer zone left untreated. Attachments 8, 9, 10, and 11 outline the provisions for aerial applications of granular and liquid formulations of rice pesticides included in the program. Special attention should be directed, when possible, towards enforcement efforts during aerial applications at sites adjacent to agricultural drains.

8. Weir boxes that control discharges of water from rice fields shall be fully secured during pesticide holding times. A soil berm must be in place in front of each of these boxes

to a level above the water line, or drop boxes shall be filled with soil to a level above the water line. The need for such berms in fields where nonconventional water management systems are utilized, e.g., static/positive pressure systems, may be evaluated by County Agricultural Commissioner's office staff on a case-by-case basis.

Information transmittal of rice pesticide use data from the county offices to DPR will be handled at the end of July rather than on a weekly basis. My staff will discuss the details of this process with your deputies.

Monitoring results will not be available this year until approximately five weeks after sample collection. DPR will continue to send monitoring program results to your offices, via facsimile, when available.

Thank you for your assistance. Your cooperation continues to help make the program a real success. If you have questions, please contact Dr. Nan Gorder at (916) 324-4265 or Mr. Marshall Lee at (916) 324-4269.

Sincerely,

James W. Wells
Director
(916) 445-4000

cc: Dr. Nan Gorder
Mr. Marshall Lee

APPENDIX 2

dpr Department of Pesticide Regulation

Paul E. Helliker
Director

Gray Davis
Governor

Winston H. Hickox
Secretary, California Environmental Protection Agency

April 17, 2001

ENF 01-17

TO: County Agricultural Commissioners

SUBJECT: RICE PESTICIDES PROGRAM FOR 2001

The suggested permit conditions for the molinate (Ordram®) worker safety requirements, the rice water-holding requirements, and the drift control requirements for certain rice pesticides will remain the same for 2001, except for new suggested permit conditions for thiobencarb concerning seepage. Please note that the attached suggested permit conditions have been updated and will reflect the year 2001. Propanil regulations also remain unchanged from the previous year; however, please review closely this year's program expectations.

This year we will be starting the second tri-annual review period as adopted by the Central Valley Regional Water Quality Control Board's (CVRWQCB's) Resolution No. 5-01-074 in which the Regional Board approved water quality management practices for the 2001 through 2003 rice seasons.

The Department of Pesticide Regulations (DPR) will continue monitoring the following pesticides at Colusa Basin Drain, Butte Slough, and Sacramento River: molinate, thiobencarb, carbofuran (last year to insure use has ceased), methyl parathion, malathion, propanil, and triclopyr.

Seepage Control Requirements

DPR developed suggested permit conditions to mitigate potential lateral movement of thiobencarb from rice fields. Concerns as to thiobencarb seepage began following the detection of the herbicide by the CVRWQCB. A memorandum from Dr. John Sanders, Chief of the Environmental Monitoring Branch, to the CVRWQCB is attached for your reference. Seepage is the lateral movement of irrigation water through a rice field levee or border to an area outside the normally flooded production area. Seepage can occur through levees into adjacent dry fields or into adjacent drains and canals. Seepage is not water leaking through the "field drop box."

DPR is asking county agricultural commissioners (CACs) to check for seepage when inspecting water-holding compliance. Although CACs are not expected to drive around the entire field, DPR does request a check for seepage or collection of seepage that occurs through the outer borders of a field or the bottom border located at the lowest part of the field.

NOTE: The drop box should be located at the lowest part of the field; therefore, water seeping through the surrounding border will collect there.

CACs may use the water-holding inspection logs to document seepage observations. The Pesticide Use Monitoring Inspection Form (PR-ENF-021) may also be used to document seepage observations. When using the form, indicate "water-hold inspection" on the blank line under "application inspection." In the "Remarks" section, write one of the following comments for each field inspected: No Seepage Detected, Seepage Flow less than 5 gallon per minute, or Seepage Flow more than 5 gallon per minute.

Although, CACs are not required to inspect for "compacted" borders, if seepage is occurring, CACs should consider if borders were "compacted." DPR requests that the CAC provide a copy of the inspection to the grower whenever seepage is observed. Also, a copy of all seepage inspections should be faxed to Dr. Sanders at (916) 324-4088 or e-mailed to him at <jsanders@cdpr.ca.gov> August 1, 2001. DPR plans to compile the information provided by the CACs and submit it to the CVRWQCB.

Please continue to distribute the brochure, *Seepage Water Management, Voluntary Guidelines for Good Stewardship in Rice Production, Publication 21568,* to growers at the time of permit issuance.

Warrior® & Dimilin

Two active ingredients, lambda-cyhalothrin (Warrior®) and diflubenzuron (Dimilin), are currently registered for use on rice. Warrior® and Dimilin may be used as alternatives to Furadan®5G, which was cancelled for application to rice, effective August 31, 2000.

Due to concerns of potential aquatic toxicity and possible sediment accumulation resulting from Warrior® applications, the California Department of Fish and Game (DFG), the California Rice Commission, and Syngenta (registrant for Warrior®) plan to work together to identify cooperative rice growers where water monitoring will take place during the 2001 season.

Methyl Parathion Use Status

On October 27, 1999, the U. S. Environmental Protection Agency accepted the voluntary cancellation of methyl parathion (Federal Register, Notice FRL-6387-8). This action cancels specific food/feed crops and non-food uses. The action further requires that current methyl parathion registrations be revised to specify certain food/feed uses, including rice. Penncap-M®, EPA Registration No. 4581-393-AA, is currently registered by DPR for use on rice.

Phenoxy/Dicamba Use Status

The status of phenoxy use on rice within the Sacramento Valley remains as last year. CACs may refer to Attachment 9, *Drift Control Requirements for Phenoxy/Dicamba Herbicides*, as permit conditions guidance when issuing restricted material permits.

Propanil

Ground Use Area

Within the ground use area, the CAC has authority to modify the acreage limit and buffer zones. DPR supports CAC discretion to modify buffer zones, as follows:

> For propanil ground applications, provide a one-mile buffer zone to cultivated grape vineyards, pistachios, or prunes; or a half-mile buffer zone provided a positive wind flow is away from these crops during the application. If the wind flow changes during an application, it must cease immediately.

DPR does not support a CAC's discretion to modify buffer zones beyond the aforementioned distances. Modifications of acreage limits and buffer zones should be based on the CAC's site-specific evaluation, not on "waivers" obtained from growers of sensitive crops. DPR requests CACs to restrict the practice of "waivers" to situations where the same enterprise owns both the rice and the sensitive crop.

Aerial Use Area

DPR does not endorse any decrease of the buffer zones and will not support a CAC's discretion to modify buffer zones for aerial applications.

The *1998 Propanil Aerial Use Protocol and Controls* [referenced in section 6462(1)] Limitations on Application states: "No more than 500 acres of rice may be treated with propanil by helicopter in the Colusa County aerial use area on a single day. No more than 300 acres of rice may be treated with propanil by helicopter in the Glenn County aerial use area on a single day."

Section 6462(b)(2)(C)(3) provides: "Unless expressly authorized by the commissioner, no more than 1,500 acres of rice may be treated by ground in each county per day." Therefore, the regulations allow 2,000 acres total per day (1,500 acres by ground and 500 acres by helicopter) in Colusa County, and 1,800 acres total per day (1,500 acres by ground and 300 acres by helicopter) in Glenn County.

Reporting Propanil Use Data

DPR requests the Butte, Colusa, Glenn, Placer, Sutter, Yolo, and Yuba CACs to maintain a record of propanil use on a daily basis using the Propanil Application Log (attached) or a similar electronic format. The record/log should include the number of acres treated, method of application (e.g., air/ground), and application site (e.g., section/township/range) for each application in the county. Please FAX the record/log to Ms. Nancy Grussing, Supervising Pesticide Use Specialist, at (916) 445-3097 or e-mail it to her at <ngrussing@cdpr.ca.gov>. The record/log must be received no later than the close of business on Tuesday of each week throughout the propanil use season. The record/log should reflect daily use data for the previous Tuesday through Monday report period. If no record/log of propanil use is received, DPR will assume that no use occurred during the reporting period.

Enforcement

Due to the extent of late propanil use reporting in previous years, DPR requests that CACs take enforcement action against all persons in violation of pesticide use reporting regulations. In addition, DPR requests enforcement actions for violations of restricted material sales and use laws and regulations pertinent to propanil. This use information is vital for the analysis and development of future regulations.

DPR plans to increase surveillance monitoring throughout the Sacramento Valley during the 2001 season. It is imperative that CACs inform the regulated community that strict compliance with all propanil use requirements is expected.

Shark™ 40 DF

Shark™ 40 DF Herbicide, manufactured by FMC Corporation, is currently under review by DPR. The proposed date for final approval of Shark™ 40 DF Herbicide is not known at this time.

Permit Conditions Summary

Please refer to the following suggested permit conditions when issuing Year 2001 permits for molinate, thiobencarb, methyl parathion, and phenoxy/dicamba.

Attachment A	Molinate Worker Safety
Attachment 1	Molinate Water Management Requirements
Attachment 2	Thiobencarb Water Management Requirements
Attachment 3	Methyl Parathion Water Management Requirements
Attachment 4	Malathion Water Management Requirements
Attachment 5	Drift Control Requirements for Granular Molinate and Thiobencarb
Attachment 6	Drift Control Requirements for Liquid Thiobencarb
Attachment 7	Drift Control Requirements for Malathion
Attachment 8	Drift Control Requirements for Methyl Parathion
Attachment 9	Drift Control Requirements for Phenoxy/Dicamba
Attachment 10	Propanil Application Acreage Log

DPR data reporting guidelines for the 2001 rice pesticides program will be sent to commissioners in the rice-producing counties as a separate letter.

If you have any questions concerning the suggested molinate worker safety permit conditions, rice water-holding requirements, phenoxy/dicamba, propanil, methyl parathion, and Shark™ 40 DF, please contact the Senior Pesticide Use Specialist Liaison serving your county.

Sincerely,

Scott Paulsen, Chief
Pesticide Enforcement Branch
(916) 324-4100

Attachments

cc: Mr. Dave Lawson, Syngenta, Inc. (w/Attachments)
Mr. Daniel J. Merkley, Agricultural Commissioner Liaison (w/Attachments)
John Sanders, Ph.D. (w/Attachments)
Ms. Nancy Grussing (w/Attachments)

Appendix 2

MOLINATE WATER MANAGEMENT REQUIREMENTS – 2001

I. All water from fields treated with products containing molinate must be retained on the site of application for at least 28 days following application unless:

A. The water is contained within a tailwater recovery system, ponded on fallow land, or contained in other systems appropriate for preventing discharge. The system may discharge 29 days following the last application of molinate within the system.

1. If the system is under the control of one permittee, water may be discharged from the application site in a manner consistent with product labeling.

2. If the system includes drainage from more than permittee, water may be discharged from the application site into the system nine days following application.

B. The water is on acreage within the bounds of areas that discharge negligible amounts of rice field drainage into perennial streams until fields are drained for harvest. All water on fields treated with molinate must be retained on the treated acreage until the twelfth day following application.

C. The water is on acreage treated with a preflood application of molinate. The label restrictions apply.

II. Fields not specified in I.A., I.B., and I.C. may resume discharging field water 29 days following application at a volume not to exceed two inches of water over a drain box weir. Unregulated discharges from these fields may then resume after seven days.

III. The county agricultural commissioner may authorize the emergency release of tailwater 12 days following the last molinate application, following a review of a written request (Form A), which clearly demonstrates the crop, is suffering because of the water management requirements. All water management requirements must be followed that are associated with other

pesticides that my have been applied to the site. Additionally, the requester must describe preventative action that would avoid the need for future emergency releases. Under an emergency release variance, tailwater may be released only to the extent necessary to mitigate the documented problem. Those issued an emergency release must submit to the county agricultural commissioner a report (Form B) indicating the time and duration of the emergency release and data that can be used to calculate the total amount of water release during the emergency release. Emergency release will only be granted for reasons related to rainfall, high winds, or other extreme weather conditions that cannot be moderated with management practices.

IV. The county agricultural commissioner may authorize the emergency release of Field water on the 12th day following the last molinate application, following The review of a written application that demonstrates salinity levels are damaging to the crop.

A. Applicants for such emergency releases must provide the following information:

1. All information indicated on the emergency release request form (Form A), including a description of the severity and extent of salinity damage.

2. Electrical conductivity (EC) measurements, expressed as deciSiemans perimeter (dS/m) or microSiemans per centimeter (μS/cm), from field water in each paddy suspected of having salinity problems. To most effectively demonstrate salinity problems, measurements should be taken wherever salinity problems are evident.

3. The instrument (make and model) used to determine EC measurements. The instrument must have a sensitivity range that accommodates the full range of EC values in intake and paddy water (usually a range of 0-5.0 dS/m or 0-5,000 μS/cm should be sufficient) and should have a resolution of not less than five percent. The instrument must be calibrated according to the manufacturer's instructions. The applicant must specify the method of temperature compensation (i.e., automatic, conversion table).

4. Who made the EC measurements.

5. The source of irrigation water (e.g. district supply canal, drainage canal, well etc.).

MOLINATE WATER MANAGEMENT REQUIREMENTS- 2001

B. An emergency release may be granted only if all of the following conditions are satisfied.

   1. All required information is provided.

   2. Water management requirements for rice pesticides other than molinate are satisfied.

   3. EC of paddy water exceeds 2.0 dS/m or 2,000 μS/cm.

   4. The county agricultural commissioner or his or her staff inspects the site.

C. Water may be released from paddies where EC measurements exceed 2.0 dS/m or 2,000 μS/cm and from paddies downgradient from such paddies within the same field. Water shall only be released in an amount necessary to mitigate the salinity problem.

D. Those issued an emergency release must submit to the county agricultural commissioner a report (Form B) indicating the time and duration of the emergency release and data that can be used to calculate the total amount of water released during the emergency release.

Appendix 2

THIOBENCARB WATER MANAGEMENT REQUIREMENTS- 2001

I. For rice fields treated with thiobencarb in the Sacramento Valley (north of the line defined by Roads E10 and 116 in Yolo County and the American River in Sacramento County), except those treated with Abolish® 8EC :

A. All water on treated fields must be retained on the treated fields for at least 30 days following application unless:

1. The water is contained within a tailwater recovery system, ponded on fallow land, or contained in other systems appropriate for preventing discharge. The system may discharge 20 days following the last application of thiobencarb within the system.

a. If the system is under the control of one permittee, water may be discharged from the application site in a manner consistent with product labeling.

b. If the system includes drainage from more than one permittee, water may be discharged from the application site into the system seven days following application.

2. The water is on fields within the bounds of areas that discharge negligible amounts of rice field drainage into perennial streams until fields are drained for harvest. Water from such fields must be held at least 19 days, unless the county agricultural commissioner evaluates such sites. If the commissioner verifies the hydrologic isolation of the fields, the water may be released seven days after application.

B. Fields not specified in I.A.1. and I.A.2. may resume discharging field water 31 days following application at a volume not to exceed two inches of water over a drain box weir. Unregulated discharges from these fields may then resume after seven days.

II. For rice fields treated with thiobencarb in the Southern Area (south of the line defined by Roads E10 and 116 in Yolo County and the American River in Sacramento County), except those treated with Abolish 8EC:

A. All water on treated fields must be retained on the treated fields for at least 19 days following application unless:

1. The water is contained within a tailwater recovery system, ponded on fallow land, or contained in other systems appropriate for preventing discharge. The

system may discharge 20 days following the last application of thiobencarb within the system.

a. If the system is under the control of one permittee, water may be discharged from the application site in a manner consistent with product labeling.

b. If the system includes drainage from more than one permittee, water may be discharged from the application site into the system seven days following application.

2. The water is on fields within the bounds of areas that discharge negligible amounts of rice field drainage into perennial streams until fields are drained for harvest. Water from such fields may be released seven days after application if the county agricultural commissioner evaluates such sites and verifies the hydrologic isolation of the fields.

B. Fields not specified in II.A.1. and II.A.2. may resume discharging field water 20 days following application at a volume not to exceed two inches of water over a drain box weir. Unregulated discharges from these fields may then resume after seven days.

III. For all areas, fields treated with Abolish® 8EC:

A. All water on treated fields must be retained on the treated fields for at least 19 days following application unless:

1. The water is contained within a tailwater recovery system, ponded on fallow land, or contained in other systems appropriate for preventing discharge. The system may discharge 20 days following the last application within the system.
   a. If the system is under the control of one permittee, water may be discharged from the application site in a manner consistent with product labeling.

   b. If the system includes drainage from more than one permittee, water may be discharged from the application site into the system seven days following application.

2. The water is on fields within the bounds of areas that discharge negligible amounts of rice field drainage into perennial streams until fields are drained for harvest. Water from such fields may be released seven days after

application if the county agricultural commissioner evaluates such sites and verifies the hydrologic isolation of the fields.

B. Fields not specified in III.A. may resume discharging field water 20 days following application at a volume not to exceed two inches of water over a drain box weir. Unregulated discharges from these fields may then resume after seven days.

IV. The county agricultural commissioner may authorize the emergency release of field water on the 20th day following the last thiobencarb application, following the review of a written application that demonstrates salinity levels are damaging to the crop.

A. Applicants for such emergency releases must provide the following information:

1. All information indicated on the emergency release request (Form C), including a description of the severity and extent of salinity damage.

2. Electrical conductivity (EC) measurements, expressed as deciSiemans per meter (dS/m) or microSiemans per centimeter (μS/cm), from field water in each paddy suspected of having salinity problems. To most effectively demonstrate salinity problems, measurements should be taken wherever salinity problems are evident.

3. The instrument (make and model) used to determine EC measurements. The instrument must have a sensitivity range that accommodates the full range of EC values in intake and paddy water (usually a range of 0-5.0 dS/m or 0-5,000 μS/cm should be sufficient) and should have a resolution of not less than five percent. The instrument must be calibrated according to the manufacturer's instructions. The applicant must specify the method of temperature compensation (i.e., automatic, conversion table).

4. Who made the EC measurements.

5. The source of irrigation water (e.g. district supply canal, drainage canal, well, etc.).

B. An emergency release may be granted only if all of the following conditions are satisfied:

1. All required information is provided.

2. Water management requirements for rice pesticides other than thiobencarb are satisfied.

3. EC of paddy water exceeds 2.0 dS/m or 2,000 μS/cm.

THIOBENCARB WATER MANAGEMENT REQUIREMENTS – 2001

4. The County Agricultural Commissioner or his or her staff inspects the site.

C. Water may be released from paddies where EC measurements exceed 2.0 dS/m or 2,000 μS/cm and from paddies down gradient from such paddies within the same field. Water shall only be released in an amount necessary to mitigate the salinity problem.

D. Those issued an emergency release must submit to the county agricultural commissioner a report (Form D) indicating the time and duration of the emergency release and data that can be used to calculate the total amount of water released during the emergency release.

SEEPAGE CONTROL REQUIREMENTS SUPPLEMENT - 2001

V. 1. Growers shall not allow water to seep through borders surrounding rice fields.

2. Borders surrounding each rice field shall be compacted before water is allowed to fill the field; the degree of compaction shall be sufficient to prevent water from seeping through the border. For example, compaction may be achieved by driving the tires or tracks of a tractor, or other heavy vehicle, on one side of the border.

3. A common border between two existing rice fields does not need to be compacted.

4. This requirement applies to new or reworked existing borders for the current rice season.

Appendix 2

METHYL PARATHION WATER MANAGEMENT REQUIREMENTS – 2001

Water shall not be discharged from sites treated with methyl parathion for at least 24 days following application unless the treated water is contained within a tailwater recovery system, ponded on fallow land, or contained in other systems appropriate for preventing discharge. The system may discharge 25 days following the last application of methyl parathion within the system. Treated water may be discharged from the application site in a manner consistent with product labeling.

Appendix 2

MALATHION WATER MANAGEMENT REQUIREMENTS- 2001

The Central Valley Regional Water Quality Control Board has approved a water management practice following malathion use in rice that will help meet 2001 water quality performance goals for malathion in surface water. Malathion is currently not a restricted material and not subject to use requirements or permit conditions. However, it is important that growers comply with this practice.

Water from fields treated with malathion should be held on the site of application for at least four days following application.

Water quality monitoring will be conducted in 2001 to determine the adequacy of this practice in managing malathion discharges. If malathion levels do not adequately meet the performance goal, a more formal regulatory program may be implemented in future years.

EMERGENCY RELEASE

Grower:_____ Permit No.:_____
Address:_____ Zip:_____
Field location:_____ Site No._____
(Attach detailed map)

Chemical applied:_____ Chemical applied:_____

Rate of application:_____ Rate of application:_____

Date of application:_____ Date of application:_____

Average water depth
at time of application:_____ Average water depth
at time of application:_____

Chemical applied:_____ Chemical applied:_____

Rate of application:_____ Rate of application:_____

Date of application:_____ Date of application:_____

Average water depth
at time of application:_____ Average water depth
at time of application:_____

Starting date of emergency release:_____
Acres treated in field:_____ Laser leveled? Yes_____No_____
Type of irrigation system: Flow through____ Recycle____ Static____ Other____
Date flooding began:_____ No. of days it takes to fill field:_____
Describe problem that led to emergency release:_____
_____
_____
Steps that can be taken to prevent emergency releases from this field in future years:_____
_____
_____
Recommendation (attached) by:_____
Applications by:_____
Grower's signature:_____ Date:_____
Approved by:_____
Agricultural Biologist

EMERGENCY RELEASE

Grower: _____ Permit No.: _____
Address: _____ Zip: _____
Field location: _____ Site No.: _____
Beginning date of release: _____ Ending date: _____

The grower must determine the amount of water discharged during the emergency release period. To do this, measure the width of each weir opened to allow the discharge. Then, on a daily basis, measure the height of water flowing over each weir. Record all information in the table below.

Weir 1		Weir 2		Weir 3	
Width:		Width:		Width:	
Date	Height of water	Date	Height of water	Date	Height of water

Appendix 2

DRIFT CONTROL REQUIREMENTS FOR GRANULAR MOLINATE AND THIOBENCARB APPLIED TO RICE – 2001

1. Granular molinate or thiobencarb drifting into waterways (i.e., drainage canals) or onto levees or roadways adjacent to waterways will be considered environmental contamination. Applicators found in violation will be liable for a civil penalty.

2. Granular molinate or thiobencarb shall not be applied by air if wind speed is greater than seven miles per hour to avoid drift into drainage canals and ditches.

Appendix 2

DRIFT CONTROL REQUIREMENTS FOR LIQUID THIOBENCARB APPLIED TO RICE – 2001

I. Aerial Applications

A. No aerial applications of liquid formulations of thiobencarb to rice shall be:

1. Discharged more than ten feet above the crop or target. Discharge shall be shut off whenever it is necessary to raise the equipment over obstacles such as trees or poles.

2. Applied when wind velocity is more than seven miles per hour.

3. Applied by aircraft except as follows:

a. The flow of liquid to aircraft nozzles shall be controlled by a positive shutoff system as follows:

i. Each individual nozzle shall be equipped with a check valve and the flow controlled by suckback device or a boom pressure release device; or

ii. Each individual nozzle shall be equipped with a positive action valve.

b. Aircraft nozzles shall not be equipped with any device or mechanism which would cause a sheet, cone, fan, or similar type dispersion of the discharged material except as otherwise provided.

c. Aircraft boom pressure shall not exceed 40 pounds per square inch.

d. Aircraft nozzles shall be equipped with orifices directed backward parallel to the horizontal axis of the aircraft in flight.

e. Fixed wing aircraft and helicopters operating in excess of 60 miles per hour shall be equipped with jet nozzles having and orifice of not less than 1/16 inch diameter.

f. Working boom length on fixed wing aircraft shall not exceed ¾ of the wing span; the working boom length of helicopters shall not exceed 6/7 of the total rotor length or ¾ of the total rotor where the rotor length exceeds 40 feet.

DRIFT CONTROL REQUIREMENTS FOR LIQUID THIOBENCARB APPLIED TO RICE – 2001

g. Helicopters operating at 60 miles per hour or less shall be equipped with:

i. Nozzles having an orifice not less than 1/16 inch in diameter. A number 46 (or equivalent) or larger whirlplate may be used; or

ii. Fan nozzles with a fan angle number not larger than 80 degrees and a flow rate not less than on gallon per minute at 40 pounds per square inch pressure (or equivalent).

B. Special precautions should be taken to avoid off-site deposition of liquid formulations of pesticides when applications are made adjacent to agricultural drains.

II. Ground Applications – Ground applications of liquid thiobencarb must be applied as per label instructions.

Appendix 2

DRIFT CONTROL RECOMMENDATIONS FOR MALATHION APPLIED TO RICE – 2001

I. No aerial applications of liquid formulations of malathion to rice shall be:

A. Discharged more than ten feet above the crop or target. Discharge shall be shut off whenever it is necessary to raise the equipment over obstacles such as trees or poles.

B. Applied when wind velocity is more than seven miles per hour.

C. Applied by aircraft except as follows:

1. The flow of liquid to aircraft nozzles shall be controlled by a positive shutoff system as follows:

   a. Each individual nozzle shall be equipped with a check valve and the flow controlled by suckback device or a boom pressure release device; or

   b. Each individual nozzle shall be equipped with a positive action valve.

2. Aircraft nozzles shall not be equipped with any device or mechanism which would cause a sheet, cone, fan, or similar type dispersion of the discharged material except as otherwise provided.

3. Aircraft boom pressure shall not exceed 40 pounds per square inch.

4. Aircraft nozzles shall be equipped with orifices directed backward parallel to the horizontal axis of the aircraft in flight.

5. Fixed wing aircraft and helicopters operating in excess of 60 miles per hour shall be equipped with jet nozzles having an orifice of not less than 1/16 inch diameter.

6. Working boom length on fixed wing aircraft shall not exceed ¾ of the wing span; the working boom length of helicopters shall not exceed 6/7 of the total rotor length or ¾ of the total rotor where the rotor length exceeds 40 feet.

Appendix 2

DRIFT CONTROL RECOMMENDATIONS FOR MALATHION APPLIED TO RICE – 2001

7. Helicopters operating at 60 miles per hour or less shall be equipped with:

   a. Nozzles having an orifice not less than 1/16 inch in diameter. A number 46 (or equivalent) or larger whirlplate may be used; or

   b. Fan nozzles with a fan angle number not larger than 80 degrees and a Flow rate not less than one gallon per minute at 40 pounds per square inch pressure (or equivalent).

II. Special precautions should be taken to avoid off-site deposition of liquid formulations of pesticides when applications are made adjacent to agricultural drains.

Appendix 2

DRIFT CONTROL REQUIREMENTS FOR METHYL PARATHION APPLIED TO RICE – 2001

I. Aerial Applications

A. No aerial applications of liquid formulations of methyl parathion to rice shall be:

1. Discharged more than ten feet above the crop or target. Discharge shall be shut off whenever it is necessary to raise the equipment over obstacles such as trees or poles.

2. Applied within a 300 foot downwind buffer zone from any agricultural drain.

3. Applied when wind velocity is more than five miles per hour.

4. Applied without an effective drift control agent.

5. Applied by aircraft except as follows:

a. The flow of liquid to aircraft nozzles shall be controlled by a positive shutoff system as follows:

i. Each individual nozzle shall be equipped with a check valve and the flow controlled by suckback device or a boom pressure release device; or

ii. Each individual nozzle shall be equipped with a positive action valve.

b. Aircraft nozzles shall not be equipped with any device or mechanism which would cause a sheet, cone, fan, or similar type dispersion of the discharged material except as otherwise provided.

c. Aircraft boom pressure shall not exceed 40 pounds per square inch.

d. Aircraft nozzles shall be equipped with orifices directed backward parallel to the horizontal axis of the aircraft in flight.

e. Fixed wing aircraft and helicopters operating in excess of 60 miles per hour shall be equipped with jet nozzles having an orifice of not less than 1/8 inch in diameter.

DRIFT CONTROL REQUIREMENTS FOR METHYL PARATHION APPLIED TO RICE – 2001

f. Working boom length on fixed wing aircraft shall not exceed ¾ of the wing span; the working boom length of helicopters shall not exceed 6/7 of the total rotor length or ¾ of the total rotor where the rotor length exceeds 40 feet.

g. Helicopters operating at 60 miles per hour or less shall be equipped with:

i. Nozzles having an orifice not less than 1/8 inch in diameter. A number 46 (or equivalent) or larger whirlplate may be used; or

ii. Fan nozzles with a fan angle number not larger than 80 degrees and a flow rate not less than one gallon per minute at 40 pounds per square inch pressure (or equivalent).

B. Special precautions should be taken to avoid off-site deposition of liquid formulations of pesticides when applications are made adjacent to agricultural drains.

II. Ground Applications – Ground equipment other than handguns shall be equipped with:

A. Nozzles having an orifice not less than 1/16 inch in diameter or equivalent, and operated at a boom pressure not to exceed 30 pounds per square inch; or

B. Low pressure fan nozzles with a fan angle number not larger than 80 degrees and fan nozzle orifice not smaller than 0.2 gallon per minute flow rate or equivalent, and operated at a boom pressure not to exceed 15 pounds per square inch.

Appendix 2

DRIFT CONTROL REQUIREMENTS FOR PHENOXY/DICAMBA

- The following requirements apply to Dicamba, 2,4-dichlorophenoxyacetic acid, 2,4-dichlorophenoxybutric acid, 2,4-dichlorophenoxypropionic acid, and 2-methyl-4-chlorophenoxyacetic acid (MCPA) herbicides when used in nonorchard field and row crops grown in the following areas of the Sacramento Valley:
  - The counties of Butte, Colusa, Glenn, Placer, Sutter, Yolo, Yuba; the portion of Sacramento County situated north of Highway 80; and the portion of Tehama County situated west of the Sacramento River.
  - No herbicide in an ester form shall be applied, unless expressly authorized by a permit issued by the commissioner.
  - Restrictions on types of application.
    - Fixed-wing aircraft and helicopter applications are prohibited April 1 through October 15.
    - Ground equipment applications made between April 1 through October 15 shall be made in accordance with the following requirements:
      - Prior to making ground applications, the permittee or his/her authorized representative shall complete a drift reduction techniques training course approved by a commissioner. Following the initial course, the permittee or his/her authorized representative shall complete a drift reduction techniques training course every three years. The drift reduction techniques training course shall cover the following topics: Proper boom pressure; Proper nozzle size; Relationship of boom pressure and nozzle size on droplet size and drift; Proper discharge height above the target crop/site; Effects of excessive boom length and unstable equipment on coverage and drift; Climatic effects such as air temperature, weather, and inversion conditions on drift; and Review of labeling requirements including use directions, hazard and precautionary statements.
  - Unless expressly authorized by permit, no application shall be made within two miles of any cultivated commercial cotton, grape, or pistachio planting.
  - Each operating nozzle shall produce a droplet size, in accordance with the manufacturers' specifications, not less than 500 microns volume median diameter (Dv0.5) with 10 percent of the diameter by volume (Dv0.1) not le than 200 microns.

ATTACHMENT A

2001 MOLINATE (ORDRAM) WORKER SAFETY PERMIT CONDITIONS

The following are the Worker Safety Permit Conditions for Molinate (Ordram 8-E, 10-G, and 15-GM). Please read these permit conditions carefully.

I. General Requirements

A. Personal Protective Equipment

1. Coveralls are specifically required by these 2001 molinate (Ordram) permit conditions as personal protective equipment (PPE) for handling activities in addition to the PPE requirements on the Ordram 10-G, Ordram 15-GM, and Ordram 8-E labels. These permit conditions also specify that references to a long-sleeved shirt and long pants herein, and on the Ordram 10-G, Ordram 15-GM, and Ordram 8-E product labels, shall be interpreted to mean garments meeting the definition of coveralls. As a requirement of these permit conditions, coveralls are made the responsibility of the employer as provided in 3CCR section 6736.

2. The employer shall provide, and require employees to wear, all PPE (apparel and devices) required by these 2001 molinate (Ordram) worker safety permit conditions, product labeling, and regulation(s). The employer shall provide for daily inspection and cleaning of all PPE and repair or replace any worn, damaged, or heavily contaminated PPE. The employer shall keep and wash potentially contaminated PPE separately from other clothing or laundry. All PPE must remain the property of the employer, and pesticide handlers must not be allowed or directed to take potentially contaminated PPE into their homes. Reference: 3CCR sections 6736 and 6738(a)(1), (a)(6), and (a)(8).

B. Granular Formulation: Requirements for **aerial or ground** application handlers who **will come in contact with** Ordram 10-G and/or Ordram 15-GM product.

1. Bag Handling Requirements

(a) No person shall load more than 152,000 pounds of Ordram 10-G and/or Ordram 15-GM per season. Two bag sizes are available: 500 pounds and 1,200 pounds.

(b) Ordram 10-G and Ordram 15-GM shall be loaded only in the following manner:

(1) Directly from the bulk bag into the application vehicle hopper (direct loading) or
(2) Directly from the bulk bag into a loading cone and then to the application vehicle hopper (transloading).

(c) The employer shall maintain a record of persons loading Ordram 10-G and/or Ordram 15-GM and make these records available for inspection by the county agricultural commissioner or the Director upon request.

Records shall be kept as follows:

(1) Name of person(s).
(2) The date and total pounds of Ordram 10-G loaded per day.
(3) The date and total pounds of Ordram 15-GM loaded per day.

2. Loaders or any persons having contact with or handling full, partial, or empty Ordram 10-G and/or Ordram 15-GM bags shall wear the following PPE (apparel and devices):

(a) Protective apparel combinations:

(1) A coverall or garments defined as a "coverall" in 3CCR section 6000, UNDER a disposable coverall made of a synthetic material capable of excluding particles 45 microns or larger in diameter, such as Tyvek Q®[1], KLEENGUARD®[1], polypropylene, or other brands of coverall approved by the Department of Pesticide Regulation (DPR), Worker Health and Safety Branch; **OR**

(2) A full-body cloth suit (long-sleeved and long-legged) impregnated with activated charcoal UNDER a coverall or garments defined as a "coverall" in 3CCR section 6000; **OR**

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[1]Use of trade or brand names does not imply endorsement by DPR. Trademark ownership: Gore-Tex, W.L. Gore & Associates; Tyvek, E.I. duPont de Nemours; KLEENGUARD, Kimberly-Clark; SARANEX, Dow Chemical Company.

2001 MOLINATE (ORDRAM) WORKER SAFETY PERMIT CONDITIONS

(3) A coverall or garments defined as a "coverall" in 3CCR section 6000, UNDER a chemical resistant coverall as specified in 3CCR section 6738 (g)(1). Examples of a chemical resistant coverall are rain suits, Tyvek QC®[1], Tyvek® laminated with SARANEX®[1], polypropylene laminated with polyethylene, or other brands of coverall approved as chemical resistant by the DPR, Worker Health and Safety Branch.

(b) A National Institute for Occupational Safety and Health (NIOSH) and/or Mine Safety and Health Administration (MSHA) approved full-face respirator with either cartridges(s) approved for organic vapors with a dusts/mists prefilter approved for pesticides, or a canister approved for pesticides.

(c) Chemical resistant gloves.

(d) Chemical resistant boots or chemical resistant coverings worn over boots or shoes.

(e) A tightly woven head covering.

3. Flaggers **NOT working in an enclosed cab**/vehicle shall wear the following PPE (apparel and devices):

(a) A coverall or garments defined as a "coverall" in 3CCR section 6000, UNDER either a cloth coverall or a disposable coverall made of synthetic materials capable of excluding particles 45 microns or larger in diameter. Examples of these are Tyvek Q®[1], KLEENGUARD®[1], polypropylene, or other brands of coverall approved by the DPR Worker Health and Safety Branch.

(b) A NIOSH and/or MSHA approved half-mask respirator with either cartridge(s) approved for organic vapors with a dusts/mists prefilter approved for pesticides or a canister approved for pesticides.

(c) Protective eyewear (safety glasses). Reference: 3CCR section 6738(b)(1)(E).

(d) Chemical resistant gloves.

(e) Chemical resistant boots or chemical resistant coverings worn over boots or shoes.

(f) A tightly woven head covering.

4. Flaggers **working in an enclosed cab**/vehicle shall wear the following PPE (apparel and devices):

(a) A coverall or garments defined as a "coverall" in 3CCR section 6000.

(b) Protective eyewear is not required to be worn by flaggers working in an enclosed cab/vehicle.

(c) The PPE (apparel and devices) required above in this section for flaggers shall be immediately available to the flagger and stored in a chemical resistant container.

(d) The PPE required above in this section for flaggers shall be worn when performing flagging activities outside of the enclosed cab/vehicle. Reference: 3CCR section 6738(i)(7).

C. Granular Formulation: Requirements for **aerial or ground** application handlers **not involved** in mixing or loading Ordram 10-G and/or Ordram 15-GM product.

1. Pilots shall wear the following PPE (apparel and devices):

(a) A coverall or garments defined as a "coverall" in 3CCR section 6000.

(b) Pilots involved in loading or equivalent activities (load leveling, washing windshields, handling the bucket sock, etc.) where they may come in contact with Ordram 10-G and/or Ordram 15-GM shall wear the same PPE (apparel and devices) required for loaders in section III.B.2 of these 1997 molinate (Ordram) worker safety permit conditions.

2. Ground applicators **NOT** involved in mixing or loading Ordram 10-G and/or Ordram 15-GM, **NOT** having contact with or handling full, partial, or empty Ordram 10-G and/or Ordram 15-GM bags, and **NOT working in an enclosed cab** shall wear the following PPE (apparel and devices):

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2001 MOLINATE (ORDRAM) WORKER SAFETY PERMIT CONDITIONS

(a) A coverall or garments defined as a "coverall" in 3CCR section 6000, UNDER either a cloth coverall or a disposable coverall made of synthetic materials capable of excluding particles 45 microns or larger in diameter. Examples of these are Tyvek Q®[1], KLEENGUARD®[1], polypropylene, or other brands of coverall approved by the DPR, Worker Health and Safety Branch.

(b) A NIOSH and/or MSHA approved full-face respirator with either cartridges(s) approved for organic vapors with a dusts/mists prefilter approved for pesticides or a canister approved for pesticides.

(c) Chemical resistant gloves.

(d) Chemical resistant boots or chemical resistant coverings worn over boots or shoes.

(e) A tightly woven head covering.

3. Ground applicators **NOT** involved in mixing or loading Ordram 10-G and/or Ordram 15-GM, **NOT** having contact with or handling full, partial, or empty Ordram 10-G and/or Ordram 15-GM bags, and **working in an enclosed cab** shall wear the following PPE (apparel and devices):

(a) A coverall may be substituted for the PPE (apparel) as required above in this section for ground applicators. Reference: 3CCR section 6738(i)(5).

(b) A NIOSH and/or MSHA approved half-mask respirator with either cartridges(s) approved for organic vapors with a dusts/mists prefilter approved for pesticides or a canister approved for pesticides must be worn unless working in an enclosed cab acceptable for respiratory protection. Reference: 3CCR sections 6738(i)(5).

(c) Protective eyewear is not required to be worn by ground applicators working in an enclosed cab.

(d) The PPE (apparel and devices) required above in this section for ground applicators shall be immediately available to the ground applicator and stored in a chemical resistant container.

(e) The PPE (apparel and devices) required above in this section for ground applicators shall be worn if it is necessary to exit the enclosed cab and contact pesticide treated surfaces, soil, or equipment in the treated area.

D. Liquid Formulation: Handling Requirements

1. **Liquid molinate (Ordram 8-E) shall not be applied by air.**

2. Mixers, loaders, and applicators **NOT working in an enclosed cab** who **will come in contact with** Ordram 8-E product shall wear the following PPE (apparel and devices):

(a) A coverall, or garments defined as a "coverall" in 3CCR section 6000, UNDER a chemical resistant coverall as specified in 3CCR section 6738 (g)(1). Examples of a chemical resistant coverall are rain suits, Tyvek QC®[1], Tyvek®[1] laminated with SARANEX®[1], polypropylene laminated with polyethylene, or other brands of coverall approved as chemical resistant by the DPR, Worker Health and Safety Branch.

(b) A NIOSH and/or MSHA approved full-face respirator with either cartridge(s) approved for organic vapors with a prefilter approved for pesticides or a canister approved for pesticides.

(c) Chemical resistant gloves.

(d) Chemical resistant boots or chemical resistant coverings worn over boots or shoes.

(e) A tightly woven head covering.

2001 MOLINATE (ORDRAM) WORKER SAFETY PERMIT CONDITIONS

3. Applicators **NOT** involved in mixing or loading Ordram 8-E and **working in an enclosed cab** shall wear the following PPE (apparel and devices):

   (a) A coverall and shoes plus socks may be substituted for the PPE apparel required above in this section for Ordram 8-E mixers and loaders.

   (b) A NIOSH and/or MSHA approved half-mask respirator with either cartridge(s) approved for organic vapors with a prefilter approved for pesticides or a canister approved for pesticides must be worn unless the applicator is working in an enclosed cab acceptable for respiratory protection.

   (c) Applicators of Ordram 8-E working in an enclosed cab are not required to wear protective eyewear.

   (d) The PPE (apparel and devices) required above in this section for loaders and mixers of Ordram 8-E shall be immediately available to the applicator and stored in a chemical resistant container.

   (e) The PPE (apparel and devices) required above in this section for mixers and loaders of Ordram 8-E shall be worn if it is necessary to exit the enclosed cab and contact pesticide treated surfaces, soil, or equipment in the treated area.

II. Regulatory Requirements and Definitions

A. "Chemical resistant," with respect to protective clothing, gloves, and boots, means personal protective equipment (PPE) that is constructed of a material that allows no measurable movement of the pesticide through it during use. When PPE constructed of a specific material is specified on pesticide product labeling, PPE constructed of that material shall be used. Chemical resistant material does not include woven or porous material, such as cloth, leather, or Gore-Tex™[2],

[2]Use of trade or brand names does not imply endorsement by DPR. Trademark ownership: Gore-Tex, W.L. Gore & Associates.

regardless of whether the material has been treated with a sealing agent. Reference: Title 3 California Code of Regulations (3CCR) section 6000.

A "chemical resistant suit" covers the torso, head, arms, and legs. If the ambient temperature exceeds 80°F during daylight hours or 85°F during nighttime hours, employees shall not be allowed to continue handling pesticides which require wearing a chemical resistant suit unless employees use cooled chemical resistant suits or other control methods to maintain an effective working environment at or below 80°F during daylight hours or 85°F during nighttime hours. Reference: 3CCR section 6738 (g)(2).

B. "Coverall" means a **one- or two-piece garment** of closely woven fabric or equivalent that covers the entire body, except the head, hands, and feet, and must be provided by the employer as PPE. Coverall differs from, and should not be confused with, work clothing that can be required to be provided by the employee. Coveralls are specifically required by these molinate permit conditions for handling activities in addition to the PPE requirements on the Ordram 10-G, Ordram 15-GM, and Ordram 8-E labels. Reference: 3CCR sections 6000 and 6736.

The employer shall assure that coveralls, and garments defined as a "coverall" in 3CCR section 6000 and required by these molinate worker safety permit conditions, are either cleaned daily or disposed of at the end of each employee's work shift. Employees must change out of their potentially contaminated coveralls, and garments defined as a "coverall" in 3CCR section 6000, and wash [themselves] at the end of the workday. The employer must assure that potentially contaminated coveralls, and garments defined as a "coverall" in 3CCR section 6000, are not taken home by employees. Employees who do not return to the workplace at the end of the workday must remove and store potentially contaminated coveralls, and garments defined as a "coverall" in 3CCR section 6000, in a sealable container outside their living quarters for later return to the employer. Reference: 3CCR section 6736.

C. "Enclosed cab" means a chemical resistant barrier completely surrounding the occupant(s) of the cab that prevents contact with pesticides or treated surfaces outside the cab. Reference: 3CCR section 6000.

B. "Personal protective equipment" (PPE) means apparel and devices worn to minimize human body contact with pesticides or pesticide residues that must be provided by an employer and are separate from, or in addition to, work clothing. PPE may include, chemical resistant suits, chemical resistant gloves, chemical resistant footwear, respiratory protection devices, chemical resistant aprons,

chemical resistant headgear, protective eyewear, or a coverall (one- or two-piece garment). Reference: 3CCR section 6000.

E. Respiratory Protection. The employer shall assure that the air purifying elements (prefilters, filters, and cartridges) or entire respirator, if disposable, are replaced according to pesticide product labeling directions or respiratory equipment manufacturer recommendations, whichever provides for the most frequent replacement, or absent any other instructions on service life, at the end of each day's work period. At the first indication of odor, taste, or irritation, the wearer shall leave the area and check the respirator for fit or function concerns or air purifying element replacement. Reference: 3CCR section 6738 (h)(8).

F. "Work clothing" means garments such as long-sleeved shirts, short-sleeved shirts, long pants, short pants, shoes, and socks. Work clothing is not considered PPE although pesticide product labeling or regulations may require specific work clothing during some activities. Work clothing differs from and should not be confused with a coverall. While coveralls shall be provided by the employer, work clothing can be required to be provided by the employee. Short-sleeved shirts and short pants are considered acceptable work clothing only under conditions expressly permitted by pesticide product labeling. Reference: 3CCR section 6000.

APPENDIX 3

CALIFORNIA DEPARTMENT OF PESTICIDE REGULATION (DPR)
Environmental Hazards Assessment Program (EHAP)

Laboratory Project Plan and Protocol for the 2001 Rice Pesticides Monitoring Program
Study #203
March 20, 2001

Organization and Responsibility

KayLynn Newhart is the project leader, agency contact person, and EHAP laboratory liaison for DPR's Rice Pesticide Program. The duties associated with the program include: Reviews laboratory QA/QC plans and QA reports; meets or communicates with field sampling consultant and sample custodian to evaluate progress and resolve problems; reviews and maintains QA reports.

All laboratories should report all analytical data and information to KayLynn Newhart at (916) 324-4190, knewhart@cdpr.ca.gov.

Protocol

The monitoring program shall follow the approved written EHAP protocol. Changes to the protocol must be approved by the EHAP.

Quality Assurance Objectives

Each laboratory will use their method detection limit (MDL), instrument detection limit (IDL) and a reporting limit (RL) for each analyte as documented in their analytical methods agreed between each analytical laboratory and DPR.

Method Validation

The mean and standard deviation (s) values from the method validation studies will be used to set warning and control limits at +\-2s and +\-3s, respectively. **Each laboratory will be required to notify the EHAP laboratory liaison of any changes or procedures made to their analytical method before analyzing any field samples.**

Continuing Quality Control

Accuracy is defined as a determination of how close the measurement is to the true value and is often described as percent recovery. Accuracy is to be expressed as Percent Recovery (%). All calculated values for accuracy shall be presented with the analytical results. The equation for calculating Percent Recovery is as follows:

$$\text{Percent Recovery (\%)} = \frac{\text{sample concentration}}{\text{matrix spike concentration}} \text{ X } 100$$

Accuracy will be assessed by requiring each laboratory to analyze **two** matrix spike samples per analyte for each extraction set of up to twelve field samples (Appendix 1).

Accuracy control charts will be plotted by EHAP for each chemical and method and for each control sample matrix. The warning and control limits are established as listed in the method validation section. If any continuing quality control spike recovery is not within the limits of these criteria, the following is required:

1. A check shall be made to be sure there are no errors in calculations, surrogate solutions, and internal standards. A check shall also be made on instrument performance.

2. All affected data shall be recalculated and/or the extract shall be reanalyzed if any of the above checks reveals a problem.

3. All affected samples shall be re-extracted and reanalyzed if none of the above is identified as a problem.

4. All analytical data shall be flagged as suspect if the accuracy still does not fall within the limits of the above criteria. The laboratory QA officer shall notify the EHAP QA officer within one working day after discovery of suspect data.

5. If an unacceptable value cannot be corrected, additional samples may be analyzed to determine the validity of the original sample results.

The calibration curve should be prepared such that one standard is at the reporting limit and one is higher than the highest expected amount. If after initially shooting the sample extract the concentration of the analyte falls outside the calibration range, the sample should be diluted so it falls within the calibration range. **Each laboratory shall notify the EHAP laboratory liaison of any changes in their calibration procedures.** As an interlaboratory quality control check a minimum of ten percent of the total samples collected may be analyzed by a second laboratory for verification. CDFA laboratory will analyze split samples for molinate, thiobencarb and primary analyses for carbofuran, methyl parathion, malathion, propanil, and triclopyr.

In addition, rinse blank samples for each chemical will be collected from CBD5 during weeks 3 and 6 to check for potential field contamination. Blind matrix samples will be routinely submitted to each laboratory to check for accuracy.

Background surface water will be provided by EHAP to the laboratories and used for control and fortification samples.

Backup field samples collected and stored during the study may be analyzed if sample breakage occurs or if sample results between the primary and quality control laboratories are dissimilar.

Audits of the field sampling and lab analysis may be conducted.

Reporting

Results of field sample and continuing quality control analyses shall be reported to the EHAP laboratory liaison within **21 days of the date samples are received at each laboratory**. Each laboratory shall submit legible, organized reports that contain analytical results of all samples received from EHAP. **Analytical results are to be expressed as ug/L for all samples to three significant figures.** Positive matrix blank results shall be reported. Do not correct field sample results for background levels. Indicate if the results have been adjusted for spike recoveries. **Each laboratory shall notify the EHAP laboratory liaison of any changes in their procedures for reporting sample results including number rounding procedures.** The report shall evaluate the quality of the individual sample data, based on the method validation analyses. The reports shall include the following:

1. Chain of custody (COC) forms; all analytical results are to be reported on the COC, including the name of the person extracting and analyzing the sample, date of extraction and the date of analysis for each sample.
2. Records of any quality assurance problems and questions pertaining to the samples analyzed.
3. Calculations of accuracy.
4. Reporting Limit (RL); for those samples that contain no detectable amount, write ND and indicate the RL.
5. Case narrative, if the data requires it.

In addition, the laboratory shall be prepared to provide to the EHAP lab liaison all sample custody paperwork, records of times and dates of analyses, and raw data pertaining to both the analyses and the quality control checks within 10 working days after the information is requested.

Archives

All backup samples and sample extracts shall be stored frozen or refrigerated until EHAP authorizes their disposal.

All raw data, including chromatograms, memoranda, notes, worksheets, and calculations that are necessary for the reconstruction and evaluation of the study shall be archived at each respective laboratory for at least three years.

2001 Rice Pesticide Continuing Quality Control Procedures

Using background surface water, each laboratory will generate and analyze the following blank matrix and matrix spikes with each extraction set in order to determine accuracy over the duration of the study. All continuing quality control data will be submitted to the EHAP laboratory liaison **with each extraction set**. Make sure individual field sample numbers are clearly identified with each set.

Methyl Parathion and Malathion	CDFA	PTRL
1 blank and **2** matrix spikes	0.2 ppb	0.2 ppb
Molinate	Syngenta	CDFA
1 blank and **2** matrix spikes	5.0 ppb	5.0 ppb
Thiobencarb	Valent	CDFA
1 blank and **2** matrix spikes	1.0 ppb	1.0 ppb
Carbofuran	CDFA	DFG
1 blank and **2** matrix spikes	0.5 ppb	1.0 ppb
Triclopyr	CDFA	DFG
1 blank and 2 matrix spikes	0.25 ppb	0.25 ppb
Propanil	CDFA	DFG
1 blank and 2 matrix spikes	0.1 ppb	0.1 ppb

California Environmental Protection Agency
Department of Pesticide Regulation
Environmental Monitoring
Environmental Hazards Assessment Program
1001 I Street
Sacramento, California 95814

2001 RICE PESTICIDES PROGRAM MONITORING PROTOCOL STUDY # 203

March 20, 2001

The 2001 Rice Pesticides Monitoring Program is a cooperative effort between the California Rice Commission and the Department of Pesticide Regulation (DPR). The standard operating procedures have changed from that of the 2000 program for the number of samples analyzed for molinate, thiobencarb, and carbofuran. DPR staff determined to add additional analysis for molinate and thiobencarb due to early and late detections observed during the 2000 monitoring period. Carbofuran monitoring will continue for the 2001 season only to insure it's use has completely ceased and no toxicity can be attributed to it's presence during the monitoring study. Methyl parathion and malathion are analyzed during the ten weeks toxicity is analyzed for. Water samples will be analyzed for propanil and triclopyr during their use periods from May through late June. The sampling schedule, estimated number of samples (tables 1 and 2), sample collection and delivery, and chain of custody procedures for Colusa Basin Drain (CBD5), Butte Slough (BS1), and the Sacramento River (SR1) are described in this protocol. Monitoring of CBD5 will be conducted twice weekly, and monitoring of BS1 and SR1 will be conducted on a once per week schedule throughout the pesticide application season.

The monitoring program will begin with background sampling in early April at all sample sites, two to three weeks prior to the first applications of rice pesticides, in the rice growing region of the Sacramento Valley. These samples will be collected by California Rice Commission consultant personnel in consultation with DPR staff.

Additional water monitoring will be conducted for Warrior® (lambda cyhalothrin) during the 2001 rice growing season. California Department of Fish and Game (DFG), California Rice Commission, and Syngenta (pesticide registrant for Warrior®) in consultation with DPR are in cooperation regarding lambda cyhalothrin monitoring. DFG is responsible for study design and the sampling protocol and is not included in this protocol for the routine rice pesticides monitoring program.

Sampling Methods

Sampling for molinate, thiobencarb, carbofuran, methyl parathion, and malathion for the 2001 rice growing season will be performed by a consultant chosen by the California Rice Commission. As standard operating procedure, all sampling personnel will wear rubber gloves during sampling and if contamination is suspected, the gloves will be replaced. Every attempt will be made to avoid both disturbing the bottom of the agricultural drain and sampling areas of the drain with no observable flow. All bottles and chain of custody records (COCs) will be provided by DPR. The consultant will be responsible for all bottle labeling and COC preparation. Samples will be collected using a Kemmerer water sampler (stainless steel and Teflon[7] model) at a depth equal to one-half the water column. The Kemmerer has a capacity of 1.5 liters, and a composite sample consisting of the appropriate number of sub-samples are to be deposited in a stainless steel container. The volume of water to be collected is determined by the sampling schedule. The composite sample will then be homogenized and split into 1-liter amber bottles with Geotech® water splitter provided by DPR. A COC will accompany each sample bottle. Samples will then be stored on wet or blue ice (4°C). All sampling equipment is to be cleaned immediately after sampling.

Samples to be analyzed for carbofuran, methyl parathion/malathion and propanil will be acidified with 3N HCl to a pH between 3.0 and 3.5 for increased sample stability during storage. All samples will be stored on wet or blue ice (4°C) until delivered to the laboratory for analyses. Samples to be used for toxicity tests and backups will be collected as part of the primary volume of water. Backup samples will be collected and held in storage (4°C) until the initial data analyses are complete.

Rinse blanks for each monitoring site will be prepared by pouring 4.5 liters of deionized water over the cleaned sampling equipment and collecting the resultant rinse water. The rinse water is then to be transferred to four 1-liter amber bottles and submitted for analyses with the primary samples to the primary laboratories. This process will occur in weeks four and eight for a total of two samples per target chemical.

Water temperature, pH, and dissolved oxygen will be measured at each monitoring site during all sampling periods and the data recorded on the water quality sheet provided by DPR (Attachment 1).

Lab Analysis and Sample Delivery

The California Rice Commission consultant is responsible for sample delivery arrangements. Syngenta (registrant for Ordram®) will conduct primary analysis for molinate. Valent Dublin Laboratory will conduct primary analysis for thiobencarb. Primary sample analysis will be conducted by California Department of Food and

Agriculture (CDFA) Laboratory for methyl parathion, malathion, carbofuran, propanil, and triclopyr. CDFA Laboratory will also perform quality control analysis for molinate and thiobencarb. PTRL West laboratory will perform quality control analysis for methyl parathion and malathion. California Department of Fish and Game water quality laboratory will conduct quality control analysis for carbofuran, propanil, and triclopyr. Toxicity samples will be delivered by the California Rice Commission consultant to California Department of Fish and Game's Aquatic Toxicology Laboratory (ATL) in Elk Grove, California by the close of business (earlier if possible) on Tuesday of each week

Table 1. Sampling schedule for the 2001 Rice Pesticides Monitoring Program

DATE	Sampling Sites CBD5, BS1, SR1 BS1 and SR1 sampled on day one (Tuesdays) only	
	Day 1	Day 2*
Background (2 to 3 weeks prior)	III[c] + Tox[g] + QC (quality control for molinate and thiobencarb only)	Not sampled
Week 1	I[a] + Tox[g]+WQ[i]	I[a] +WQ[i]
2	II[b] + Tox[g]+WQ[i]	II[b]+WQ[i]
3	III[c] + Tox[g]+WQ[i]	III[c] +QC[h]+WQ[i]
4	III[c] + Tox[g]+WQ[i] +RB[j]	III[c]+WQ[i]
5	IV[d] + Tox[g]+WQ[i]	IV[d]+QC[h]+WQ[i]
6	IV[d] + Tox[g]+WQ[i]	IV[d]+WQ[i]
7	IV[d] +Tox[g]+WQ[i]	IV[d]+QC[h]+WQ[i]
8	IV[d] + Tox[g] +WQ[i]+RB[j]	IV[d]+WQ[i]
9	IV[d] +Tox[g]+WQ[i]	IV[d]+WQ[i]
10	IV[d] +Tox[g] +WQ[i]	IV[d]+WQ[i]
11	V[e]+WQ[i]	V[e]+WQ[i]
12	V[e]+WQ[i]	V[e]+WQ[i]
13	VI[f]+WQ[i]	VI[f]+WQ[i]+QC[h]
14	VI[f] +WQ[i]	VI[f] +WQ[i]

a) Group I: carbofuran, methyl parathion and malathion.*
b) Group II: carbofuran, methyl parathion, malathion, thiobencarb, molinate*
c) Group III: carbofuran, methyl parathion, malathion, thiobencarb, molinate, propanil*
d) Group IV: carbofuran, methyl parathion, malathion, thiobencarb, molinate, propanil and triclopyr*
e) Group V: thiobencarb, molinate, propanil, triclopyr
f) Group VI: propanil, triclopyr
g) Tox: Toxicity testing
h) QC: Quality Control
i) WQ: Water Quality parameters measured
j) RB: Rinse Blank

Carbofuran samples need to be collected only on Tuesdays when toxicity samples are collected.

Table 2. Estimated number of primary and quality control samples from CBD5 for the routine 2001 Rice Pesticides Monitoring Program.

DATE	MOLINATE[a]	THIOBENCARB[a]	**Tuesday Only** CARBOFURAN	METHYL PARATHION & MALATHION[b]	PROPANIL	TRICLOPYR	TOXICITY
Background	1(1)[c]	1	1(1)	1(1)	1(1)	1(1)	1
Week 1			1	2			1
2	2	2	1	2			1
3	2(1)	2	1(1)	2(1)	2(1)		1
4	2	2	1	2	2		1
5	2(1)	2	1(1)	2(1)	2(1)	2(1)	1
6	2	2	1	2	2	2	1
7	2(1)	2	1(1)	2(1)	2(1)	2(1)	1
8	2	2	1	2	2	2	1
9	2	2	1	2	2	2	1
10	2	2	1	2	2	2	1
11	2	2			2	2	
12	2	2			2	2	
13					2(1)	2(1)	
14					2	2	
TOTALS	**23 (4)**	**23**	**11(4)**	**21(4)**	**25(5)**	**22(5)**	**11**

a) Molinate and thiobencarb are analyzed in a single sample by the quality control laboratory.

b) Methyl parathion and malathion are analyzed in a single sample by the quality control laboratory.

c) Numbers in parentheses indicate the number of samples taken for quality control.

Total Chemical Analyses	(Routine Rice Pesticides Program monitoring: samples for primary analyses)=125 samples (Samples for quality control (18) + 9 rinse blanks) =27 samples
Toxicity	(1 sample/wk x 10 wks + background)=11samples

Sample Total=163 samples

Attachment 1

WATER QUALITY SHEET

STUDY NUMBER 203
2001 RICE PESTICIDES PROGRAM

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
DEPARTMENT OF PESTICIDE REGULATION
ENVIRONMENTAL MONITORING
ENVIRONMENTAL HAZARDS ASSESSMENT PROGRAM
1001 N STREET
SACRAMENTO, CALIFORNIA 95814-5624

DATE/TIME: _____CREW: _____

LOCATION: _____

WATER TEMPERATURE (EC): _____AIR TEMPERATURE:_____

DISSOLVED OXYGEN (mg/L): _____CALIBRATED AT:_____

WATER pH: _____ (NUMBER OF DROPS OF 3 N HCl _____ TO A pH OF_____ IN THE CONSULTANT LABORATORY)

COMMENTS:

WATER DEPTH: _____VOLUME OF WATER COLLECTED:

APPENDIX 4

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

RESOLUTION NO. 5-01-074

APPROVAL OF THE MANAGEMENT PRACTICES
REQUIRED BY THE DEPARTMENT OF PESTICIDE REGULATION'S
RICE PESTICIDE PROGRAM
FOR THE 2001THROUGH 2003 SEASONS

WHEREAS, the California Regional Water Quality Control, Central Valley Region, (hereafter Board) published the fourth edition of the Water Quality Control Plan (hereafter Basin Plan) for the Sacramento and San Joaquin Rivers in 1998; and

WHEREAS, The Basin Plan sets performance goals for the pesticides carbofuran, malathion, methyl parathion, molinate, and thiobencarb and prohibits the discharge of irrigation return flows containing these materials unless the discharger is following management practices that the Board expects will result in compliance with performance goals; and

WHEREAS, the performance goals for carbofuran (0.4 µg/l), methyl parathion (0.13 µg/l), molinate (10 µg/l), and thiobencarb (1.5µg/l), will apply until the Basin Plan is amended; and

WHEREAS, the performance goals apply to all waters designated as freshwater habitat; and

WHEREAS, the Department of Pesticide Regulation (DPR) has a Rice Pesticide Program to reduce the off target movement of pesticides applied to rice fields; and

WHEREAS, carbofuran is no longer available for use on rice fields; and

WHEREAS, in a 31 December 2000 document titled *Information on Rice Pesticides Submitted to the California Regional Water Quality Control Board,* DPR proposed a list of management practices that will control the discharge of malathion, methyl parathion, molinate and thiobencarb from rice fields; and

WHEREAS, seepage of treated water beyond the perimeter of field perimeter and drift during aerial applications continue to be significant sources of pesticides in surface waters and the DPR report indicates that further information is expected this year regarding efforts to control these sources; and

WHEREAS, on 13 March 2001 DPR provided information on additional restrictions that will be added to use permit conditions in order to reduce seepage of water containing pesticides through borders surrounding rice fields; and

WHEREAS, DPR is monitoring activities related to drift concerns and will put forth to stakeholders the first phase of a long-range plan for minimizing pesticide drift which will revise current drift control regulations and the adoption of drift minimization requirements as well as introduce additional regulatory changes, the development of best management practices, and outreach activities as components of the Plan; and

WHEREAS, the information provided by DPR shows that there is a trend toward increasing use of thiobencarb, and more frequent detections at the intake for the City of Sacramento drinking water supply; and

WHEREAS, thiobencarb concentration exceeded the performance goal in every sample collected from the Colusa Basin Drain (CBD5) monitoring site in 2000; and

WHEREAS, the Rice Pesticide Program will be conducting water quality monitoring for pesticides that are not addressed in the Basin Plan; and

WHEREAS, DPR acted as lead agency under the California Environmental Quality Act (CEQA) by developing the rice pesticide control effort pursuant to its certified program; and

WHEREAS, DPR consulted with the Board during the preparation of the rice Pesticide Program; and

WHEREAS, the Rice Pesticide Program concludes that there will be no adverse impacts to the environment and after reviewing how the control program will be conducted in 2001, the Board agrees there will be no significant impact on water quality; and

WHEREAS, The Board, in a public meeting, heard and considered all comments pertaining to proposed recommendations for the control of discharges containing the five pesticides; therefore be it

RESOLVED, that the Board approves the management practices required by the DPR Rice Pesticide Program as appropriate for the discharge of rice field irrigation return flows containing malathion, methyl parathion, molinate, and thiobencarb during the 2001 through 2003 rice seasons; and

BE IT FURTHER RESOLVED, that the staff is directed to schedule Board reconsideration of the management practices if concentrations of thiobencarb at the intake to either the City of Sacramento or the City of West Sacramento drinking water supplies exceed the maximum level detected at the City of Sacramento drinking water intake during the period of 1998 through 2000; and

BE IT FURTHER RESOLVED, that the discharge of seepage water from treated rice fields to surface waters during the pesticide holding periods described in the DPR program is not an approved management practice if such seepage contains malathion, methyl parathion, molinate, or thiobencarb; and

BE IT FURTHER RESOLVED, that parties discharging seepage water from treated rice fields to surface waters during the pesticide holding periods described in the DPR program are subject to enforcement action by the Board if such seepage contains malathion, methyl parathion, molinate, or thiobencarb; and

BE IT FURTHER RESOLVED, that by 1 January 2002 DPR is requested to provide an update on any new drift control programs along with an estimate of the degree to which the program will reduce the discharge of rice pesticides into surface waters; and

BE IT FURTHER RESOLVED, that DPR is requested to provide a written annual summary of the results of the Rice Pesticide Control Program by 1 January of the following year, including the results of all water quality monitoring for pesticides applied to rice fields;

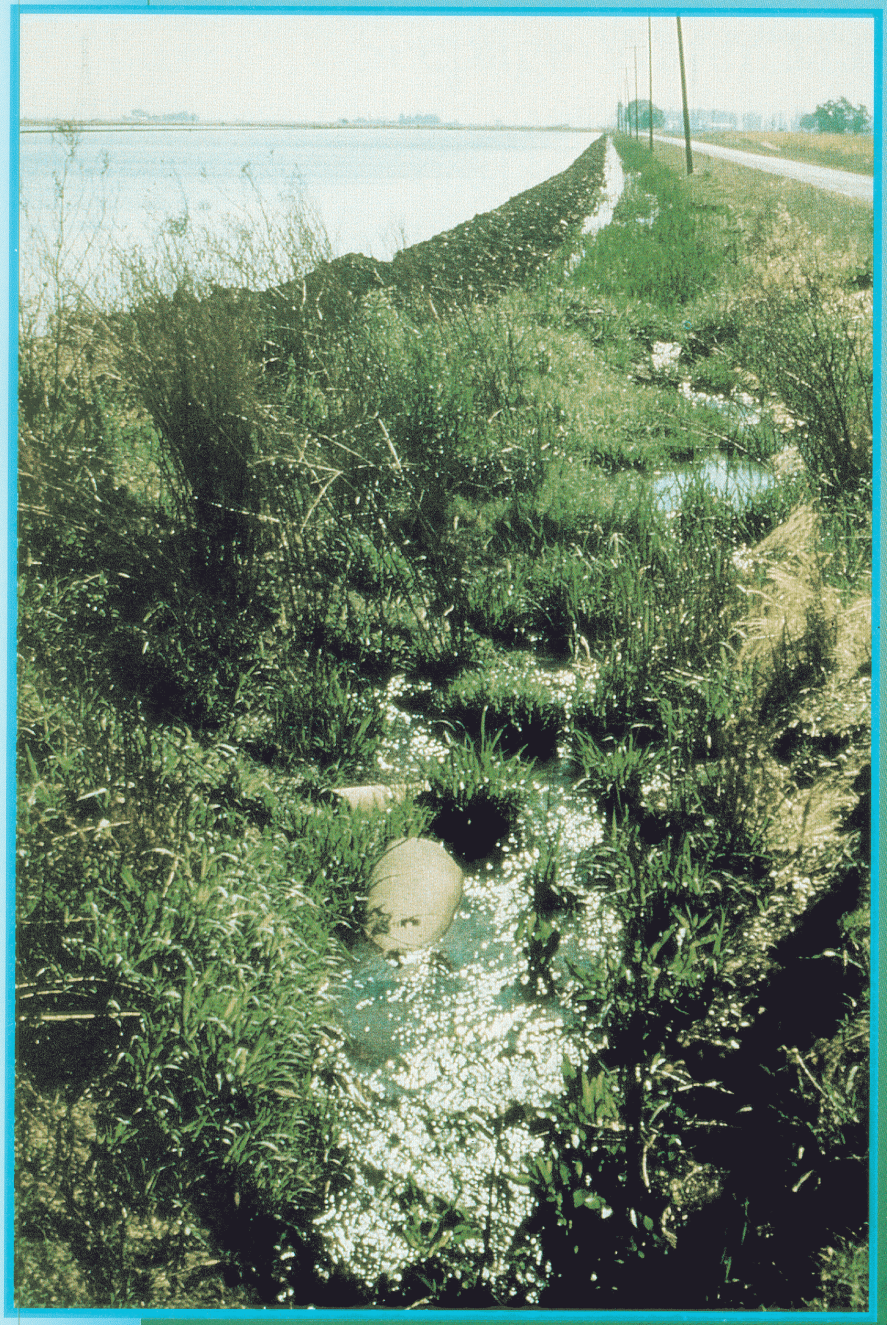
BE IT FURTHER RESOLVED, that DPR, working with the rice industry and other parties involved in the Rice Pesticide Program, is requested to evaluate and report on the feasibility of holding all water on molinate and thiobencarb-treated rice fields in the Colusa Basin watershed until 15 June to minimize discharges and peak concentrations at times when seepage and aerial drift enter surface waters and performance goals have not been met. The results of this evaluation should be submitted no later than 1 January 2002.

I, GARY M. CARLTON, Executive Officer, do herby certify the foregoing is a full, true, and correct copy of a Resolution adopted by the California Regional Water Quality Control Board, Central Valley Region, on 16 March 2001.

GARY M. CARLTON, Executive Officer

APPENDIX 5

Seepage Water Management



Voluntary Guidelines for Good Stewardship in Rice Production

University of California
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3.5m-pr-9/98-SB/VFG

Seepage Water Management

Voluntary Guidelines for Good Stewardship in Rice Production

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S. C. SCARDACI, University of California Cooperative Extension Farm Advisor, Colusa County

What is seepage?

Seepage is the lateral movement of irrigation water through a rice field levee or border to an area outside the normally flooded production area (fig. 1). Seepage can occur through levees into adjacent dry fields or into existing drains and canals. Although leakage caused by crayfish and rodent burrowing is not considered seepage, it can also result in the movement of irrigation water away from rice fields.

Figure 1. Seepage is the movement of water from a flooded rice field into an adjacent nonmanaged area. In this photo, the dark areas near the levee indicate seepage.

How can I recognize seepage?

Seepage appears early in the growing season as a wet area on the outside of border levees or in adjacent dry fields (see fig. 1). Seepage is readily apparent later during the growing season as an accumulation of water or by the growth of green weeds along the edge of a field (fig. 2; see also cover photo). Occasionally, seepage appears as a wet area that can damage a perimeter road.

Figure 2. Unwanted seepage in a ditch near and around a drain during the holding period. Note the abundance of weeds near the drain.

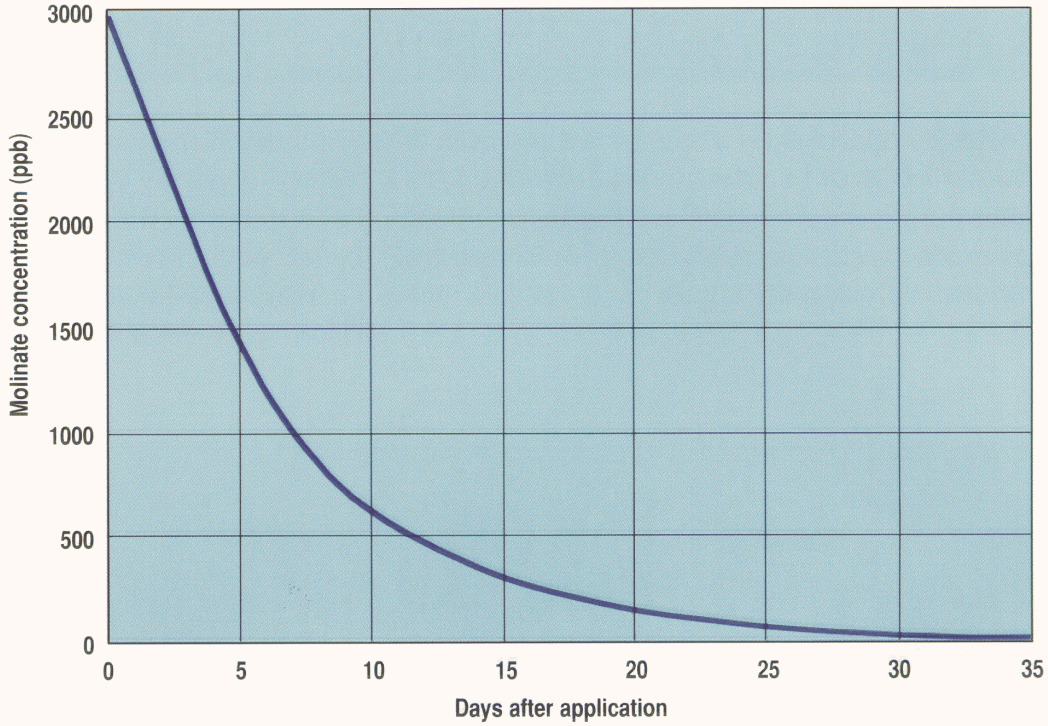

Figure 3. Typical dissipation curve of molinate (Ordram) in a commercial rice field. Concentrations of molinate and other pesticides in seepage water are likely to reflect the concentrations of the water in the field. Adapted from S. C. Scardaci et al., "Evaluation of rice water management practices on molinate dissipation and discharge, rice pests, and rice production" (University of California Agronomy Progress Report 200, 1987); and L. J. Ross and R. J. Sava, "Fate of thiobencarb and molinate in rice fields" (Journal of Environmental Quality 15:220–225, 1986).

Water can also seep directly from a field into an adjacent drain or canal. This seepage may be difficult to recognize, but the inability to maintain water depth may indicate that it is occurring. Checks or fields that use significantly more water than others, even though soil types are comparable, may actually be seeping. If you are satisfied that your practices are adequate for good water management (level fields, good rodent and crayfish control, rice boxes in good repair, etc.), seepage may be the cause of the water loss. Seepage can cause excessive water use and can create difficulty in maintaining uniform water levels even when the best water management practices are used.

Why is seepage a problem?

Seepage water that contains high concentrations of pesticides can hinder efforts to comply with California's stringent water quality goals. Efforts to meet these

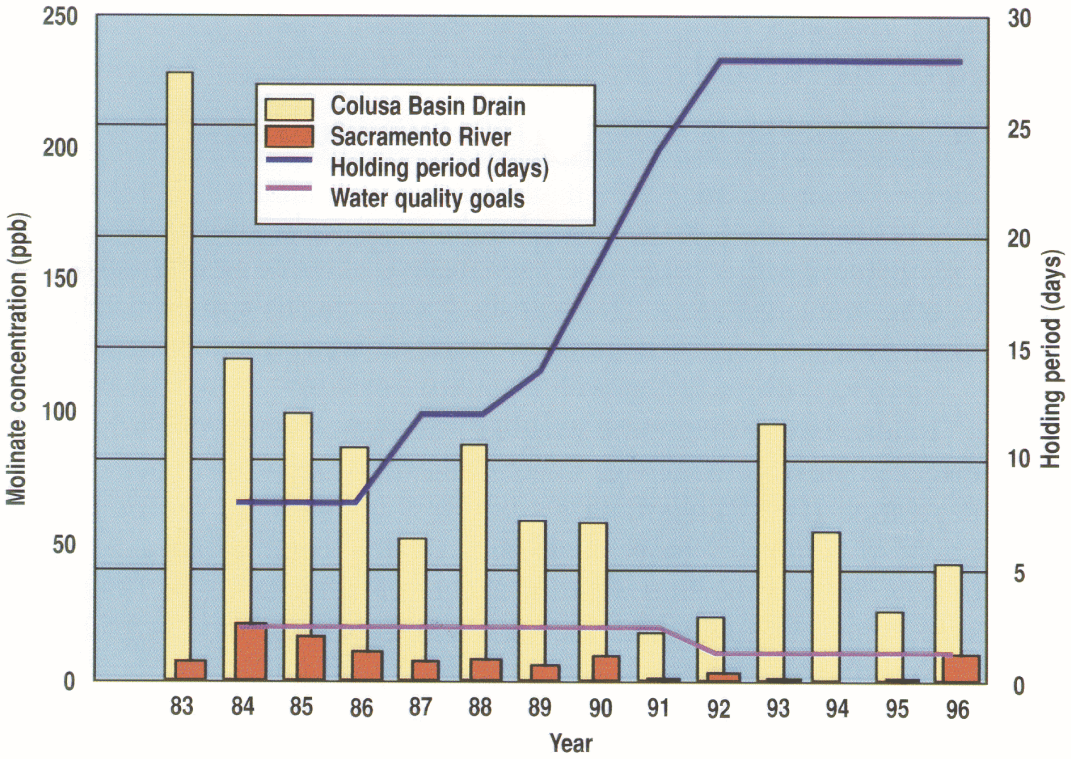

Figure 4. Maximum concentrations of molinate (Ordram) in the Colusa Basin Drain and the Sacramento River. In recent years, water quality goals in the drain and elsewhere were exceeded before the end of water-holding periods, suggesting that seepage and off-target applications (e.g., drift) remain important sources of pesticides.

goals depend on long holding periods, which allow pesticides to dissipate almost completely in rice fields before release. Figure 3 illustrates dissipation for molinate (Ordram), a rice pesticide used on nearly all California rice acreage. Note that long holding periods reduce the amount of molinate leaving the field.

Nevertheless, the concentrations of rice pesticides found in many agricultural drains exceed the levels found in tailwater released from rice fields after an adequate holding period. Therefore, seepage and off-target applications (e.g., drift) are believed to be the sources of the high concentrations currently found in agricultural drains. As holding periods for rice pesticides increased during the last decade and the contribution of fieldwater releases to pesticide loading of surface waters declined (fig. 4), the relative contribution of seepage to this loading was recognized. Currently, seepage is regarded as an important contributor to pesticide loading in Sacramento Valley waterways.

What is the scientific evidence to indicate that seepage water contains pesticides?

Rice pesticides, such as molinate, that do not strongly adsorb to soil particles can move with seepage water from treated fields into agricultural drains or other nontarget areas. This seepage water contains approximately the same concentration of certain rice pesticides as water in the field.

In an effort to determine whether rice pesticides, particularly molinate, can move with seepage water, California's Department of Pesticide Regulation (DPR) undertook a study (unpublished) to determine the extent of molinate movement from treated commercial rice fields through levee banks into adjacent ditches or fallow fields. In 1992, two sites located in commercial rice fields in Colusa County were chosen because they were known to have seepage problems in previous years. The cooperation of the growers and the aerial applicators was obtained prior to the study to ensure that aerial drift was not a problem.

Prior to the application of molinate, the suspected seepage areas were covered with heavy plastic tarps to prevent contamination from aerial drift; these areas were kept covered throughout the study. At the first site, on a Willows clay, the molinate concentration in the seepage water peaked 2 days after application at 205 parts per billion (ppb). At the second site, on a Wikoda silty clay, concentrations at 6 days after sampling were as high as 720 ppb. When seepage water containing such high concentrations flows into surface waterways, water quality goals are threatened. At the time of the study, the water quality goal for molinate was 10 ppb for all public waterways.

While this study was not able to determine the extent of seepage throughout the Sacramento Valley, it did show that molinate can move with seepage water through levees to nontarget areas.

Other unpublished studies conducted by the Central Valley Regional Water Quality Control (CVRWQC) Board found that both molinate and carbofuran (Furadan) are present in seepage water in ditches adjacent to treated fields. Water-soluble rice pesticides are likely to be present in the seepage water soon after the field has been treated.

Where is seepage most likely to be a problem?

Seepage is most likely to cause water quality problems in areas adjacent to or near agricultural drains or canals. If efforts are not made to keep seepage water on the farm and out of drains, water quality goals may be exceeded, as they have been exceeded in the past in agricultural drains.

Keeping treated rice field waters within the irrigation system and out of drains that leave the farm during the holding period is the most important goal of seepage control.

Seepage problems can also be compounded by aerial drift. If pesticides have drifted to border levees, perimeter levee roads, or fallow areas, any seepage water, even untreated water, may pick up and carry pesticides to drains and canals. Good communication with aerial applicators is important to establish the common goal of keeping drift from nontarget areas.

When is seepage most likely to create a problem?

Seepage is most likely to be a problem during early stand establishment and water-holding periods (see fig. 3). Concentrations of pesticides are highest in fields immediately after an application. Also, rice field soils are more permeable early in the season, before levees have had an opportunity to settle.

Why are rice growers being asked to control seepage water?

The CVRWQC and the DPR believe that water quality can be impacted if seepage water is allowed to reach agricultural drains. Statewide, water-holding periods have reduced rice pesticide concentrations to near non-detectable levels in the Sacramento River. However, concentrations of rice pesticides continue to exceed water quality goals in agricultural

drains. For example, the Colusa Basin Drain (see fig. 4), the primary agricultural drain for Glenn, Colusa, and Yolo Counties, continues to experience peak concentrations above established water quality goals. Rice growers in all counties should make every effort to prevent seepage problems and to avoid additional restrictions.

If voluntary efforts to control seepage by rice growers are sufficient to minimize the impacts of seepage on the agricultural drains, no future regulatory actions will be necessary.

What conditions or practices might result in a seepage problem and what can be done to minimize the impact of seepage or leaks?

Recognizing the causes of seepage as well as when and where it occurs can be the first step to good seepage management. Consider some of the following questions in deciding whether you may have a seepage problem and what steps to take to control it.

Simple Seepage Solutions
Common Sense Tips for Managing Seepage and Leaks

- First and foremost, block any exits of the seepage ditch that may drain into agricultural drains or canals.
- If the seepage problem is extreme and cannot be prevented, a small sump and pump may be needed to move water back into the system or onto fallow land.
- Carefully check levees and banks for crayfish and rodent damage. Repair leaks and control pests when present according to IPM guidelines.

Seepage Prevention Begins with Sound Levee Construction and Maintenance

- Whenever possible, build border levees in the fall to allow for settling and compaction during the rainy winter months.

- Always build levees at a moisture content suitable for maximum compaction of your soil type. See your local U.S. Natural Resources Conservation Service engineer for details.

- Ensure that levee construction begins with a solid foundation and core. Do not build levees on top of a straw layer or other organic matter, as this may lead to horizontal flow below the levee. Avoid excessive straw and organic matter in levee construction.

- Sandier soils may require wider border levees.

- Compact and firm up the levee core during construction using a tractor track.

- If feasible, surround the levee system with a perimeter road to help ensure that all water is contained within the system.

- Use the recommendations for levee construction in the U.S. Natural Resources Conservation Service publication *Closed Rice Water Management Systems* (USDA, 1994), available from your local Natural Resources Conservation Service office or county agricultural commissioner.

- Inspect and repair permanent levees for wind, wave, crayfish, and rodent damage both prior to flooding and during the growing season.

- Control crayfish and rodents according to University of California Statewide Integrated Pest Management (IPM) guidelines (see *Integrated Pest Management for Rice*, 2d ed., UC DANR Publication 3280, 1993; see also the UC IPM website at http://www.ipm.ucdavis.edu). Some county agricultural commissioners' offices supply rat bait for a small fee.

Recognizing Seepage
A Checklist

- ✓ Have you noticed wet, soft, weedy areas outside your rice fields?
- ✓ Can water from these damp areas easily flow into agricultural drains and canals?
- ✓ Do you construct drain ditches to protect perimeter roads?
- ✓ Do you typically rotate rice with other crops that require that you construct new levees when rice is grown?
- ✓ Do you construct levees in the late spring so that levees do not have a chance to settle during the rainy winter months?
- ✓ Have you experienced problems with crayfish burrowing around rice boxes or through levees?
- ✓ Have you noticed rodent damage to rice, which may indicate rats living in and burrowing in levees or canal banks?
- ✓ Do you have difficulty maintaining uniform water depth in certain fields or checks despite adherence to otherwise good water management practices?
- ✓ Do some fields or checks use significantly more water than others?

A 'Yes' to any of the above questions can mean your farm is at risk for seepage problems. Voluntary efforts to control seepage can begin by observing good levee construction practices.

APPENDIX 6

dpr

Department of Pesticide Regulation

Paul E. Helliker
Director

Gray Davis
Governor

Winston H. Hickox
Secretary, California Environmental Protection Agency

MEMORANDUM

TO: Rudy Schnagl, Senior Landfill and Water Use Analyst
Central Valley Region V
3443 Routier Road
Sacramento, California 95827-3098

FROM: John S. Sanders, Chief
Environmental Monitoring Branch
(916) 324-4155

DATE: March 13, 2001

SUBJECT: RICE PESTICIDE PROGRAM

Board staff expressed concern about the increase of detections of thiobencarb at the City of Sacramento drinking water-intake during the last three years. Although the Maximum Contaminant Level (MCL) of 1.0 parts per billion for thiobencarb has not been exceeded, Board staff wants the Department of Pesticide Regulation (DPR) to take actions to insure that thiobencarb detections at the water intake do not exceed the established MCL.

After discussions with rice industry representatives, Board staff, and the County Agricultural Commissioners (CAC), DPR agrees to take the following actions to address Board staff concerns:

1. DPR will issue suggested permit conditions to the CAC that state, "Growers shall not allow water to seep through borders surrounding rice fields." CAC staff will check for seepage at the same time they do water holding inspections. CAC staff will notify growers of seepage situations and report the information to DPR. Permit conditions will also require compaction of borders surrounding rice fields. A copy of the additional permit condition language is attached.

2. As part of the annual update for the Rice Pesticides Program DPR provides to Board staff, DPR will include an update on our efforts to control drift.

3. DPR commits to work with the rice industry to evaluate and report on the feasibility of holding all water on molinate- and thiobencarb-treated rice fields in the Colusa Basin watershed until June 15 to minimize discharges and peak concentrations at times when seepage and aerial drift enter surface water.

We believe that thiobencarb concentrations will also be lower this year than in the past three years because the acreage of rice planted this year will be significantly less than in recent years. Also, new herbicides are being introduced that will replace some of the thiobencarb use. For example, up to 50,000 acres of rice can be treated this year with the herbicide, Clincher, instead of thiobencarb.

If you have any questions, please call me at (916) 324-4155.

Attachment

cc: Paul Helliker
Paul Gosselin
Doug Okumura

bcc: Scott Paulsen
Roy Rutz
Vic Acosta
Bob Rollins
Pat Dunn
Kaylynn Newhart
Danny Merkley
CAC of Sutter, Sacramento, Colusa, Glenn, Yolo, Placer, Yuba, Butte